# Railway Age Gazette

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THE success of the soda ash treatment of boiler waters depends largely on the proper blowing off of boilers so as to prevent the accumulation of sodium sulphate in solution, which produces foaming. On account of the objection to blowing off a large volume of water in a short period, the author of a paper which appears elsewhere in this issue recommends continuous blowing through a blow-off valve of ordinary size, which is bushed or reduced in size by a steel nipple, so that the opening is only ¼ in. in diameter. At ordinary boiler pressure this will discharge 450 gals. of water per hour, and it is proposed to blow off at this rate except when the engine is working hard up grade and when the steam consumption is equal to the full water supply of one injector. Such a radical change, which involves indefinite waste of water and fuel, should only be used under the most careful regulation, and it is doubtful whether many enginemen will take sufficient interest in their work to prevent undue waste. The expense of the proposed practice should also be investigated by exact measurements of water discharged, of its temperature and of the amount of coal required to heat water to that temperature. The author's figures for the last item is based on too high a rate, 25 lb. of water heated to the temperature due to 200 lb. steam pressure per pound of coal. This estimate is based on a high figure for the heat value of the coal and a higher boiler efficiency than is obtained in locomotive practice. For western coals 12,000 B. t. u. is a fair average heat value, and the average efficiency of locomotive boilers is not over 50 per cent.; so that one pound of coal would deliver 6,000 B. t. u. to the water. The number of heat units in water at 200 lb. pressure is 387, and $\frac{6,000}{387} = 15.5$. This estimate shows only 15.5 lb. water heated to the temperature of blow-off when the engine is running in regular service, instead of 25 lb., as assumed by the author. The figures representing the loss due to continuous blowing off are, therefore, too low, and only about 60 per cent. of that here estimated; and if our assumptions are nearly correct, the expense due to this practice, as given in the paper, should be increased in that proportion. Whether continuous blowing off would be economical at such an expense for the extra coal consumption, depends on the cost of coal, and there are numerous places in the alkali district where it would be prohibitive for this reason. The new practice which the paper suggests cannot have general application, but should have expert investigation on every line to determine its actual economy.

WHILE the Panama canal bill has been pending there has also been pending a bill to appropriate $250,000 to aid the states to develop good roads. This measure was passed by the House but defeated in the Senate. The estimated cost of the Panama canal is $375,000,000, or about $7,500,000 a mile. In other words, the estimated cost of every mile of it is thirty times as great as the total amount that it was proposed to appropriate to help along the cause of good roads. The need for better roads is one of the crying economic and social needs of the United States. A reasonable outlay for their development probably would do more to reduce the total economic cost of transportation than any other equal possible expenditure. The benefit of such expenditure, if it were spread all over the country, would be shared by all classes of the people. The largest part of it would accrue to the farmer, whose expenditure for transporting his crops from his farm to the nearest railway station often exceeds the railway rate from the railway station to the great central markets. Yet while Congress proposes to open free to the owners of coastwise vessels a waterway on which it is expending $375,000,000, it refuses to appropriate $250,000 for good roads. The much-denounced railways, the animus against which is one of the main influences back of the Panama canal legislation, are doing much and spending much every year to promote the cause of good roads in the

agricultural districts and the government of the United States does practically nothing at all along this line, while it spends millions on millions, not only on waterways, such as the Panama canal, which will be used, but also on inland waterways which are and will be used hardly at all. Why is there such a difference between the way waterway legislation is dealt with and the way good roads legislation is dealt with? The only explanation seemingly is that the selfish interests which benefit, or hope to benefit, by the waterway legislation are organized and vocal, while the very much larger interests which would be very much more benefited by a very much smaller expenditure on the highways do not so clearly perceive where their selfish advantage lies and are not so well organized and persistent in lobbying to promote it.

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CONGRESS now seems almost sure to agree on a bill which will permit free use of the Panama canal by American vessels engaged in the coastwise trade and also in foreign commerce. The Hay-Pauncefote treaty, which was made with Great Britain before the building of the canal began, provides that the canal shall be opened on equal terms to the vessels of all nations. It was always understood up to the time that legislation on the toll question came up that this meant that the canal was to be opened on the same terms to the vessels of all other nations as to vessels owned and operated by citizens of the United States. When the treaty was before the United States Senate on December 13, 1900, the following amendment to it was proposed: "Strike out article 3 and substitute, 'The United States reserves the right in the regulation and management of the canal to discriminate in respect of the charges of traffic in favor of vessels of its own citizens engaged in the coastwise trade.'" On roll call this was rejected by vote of yeas, 27; nays, 43. It is now contended by those who oppose levying tolls on American ships that what the treaty means is that the canal shall be opened on equal terms to the vessels of all nations other than the United States. But this is exactly what the amendment that we have quoted would have provided, and it was defeated. The Senate thereby put its own interpretation on the treaty at the very time when it was adopting it. No wonder, then, that the British government protests against the proposed free toll legislation as a proposal to violate our treaty obligations. No wonder the London *Daily Express* says that "Nothing heretofore has been done or attempted under the pretenses of diplomacy that has been so frank in its repudiation of a solemn covenant between great powers." There never can be any good excuse for the violation of a contract entered into by parties both of whom fully understand its terms and are entirely free to make it or not, as they choose. The nation that makes contracts in such circumstances and then deliberately breaks them is no better than the man who does so. And in this case the United States is preparing to break a solemn contract, and thereby incur just odium throughout the civilized world, to secure for the American public as a whole what every impartial and disinterested expert believes will be a commercial disadvantage, not a commercial advantage. "The demand for discrimination in favor of American ships," said the House committee on interstate and foreign commerce, in its report after a thorough investigation of the Panama canal question, "presents a square issue between a small fraction of the coastwise shipping interests and the entire population of the United States." In other words, it is proposed to sacrifice the interests of the "entire population of the United States" and the honor of the government of the United States, in order to promote the interests of those who desire directly or indirectly to profit by the coastwise traffic. What sufficient motive can there be to prompt Congress to act thus? It is apparently being influenced by the organized activity and self-interest of those who expect pretty directly to profit by a free toll policy, and by prejudice and animus against the railways.

## ILLINOIS COMMISSION ON WESTERN SPRINGS COLLISION.

THE Illinois Railroad & Warehouse Commission in its report of its investigation of the collision on the Burlington at Western Springs on July 14 reviews the circumstances of the disaster, fixes the immediate responsibility on five employees, and recommends, for the Burlington in particular, the installation of distant signals and a revision of the "block clear" rule; and for railways in general a minimum flagging distance, better instruction of employees regarding the rules and their responsibilities, and automatic stops.

The commission made a study not only of the immediate contributing causes of this disaster, but also of the remote underlying causes, and for this purpose examined the Burlington's manual block system and method of operation. The "cause of causes" is traced back to the public, which is held at fault for demanding speed that is admitted to be dangerous, and to the government and the railways, which are censured for acceding to the demands of the public, the former in respect to the carrying of mail, and the latter in operating fast trains close together. These findings voice opinions which railway men have held for some time regarding conditions which, deplorable as they are, have seemed, nevertheless, to be economic —or, more accurately, competitive—necessities.

The commission conducted its investigation along the broadest lines, and in the fairest attitude toward railways in general and the Burlington in particular. But unfortunately most of its recommendations and conclusions are not so commendable as the spirit in which they were made. Taking them up in the order mentioned, it may be said with reference to distant signals that these were being installed on the Burlington before this accident occurred, which was an admission of their need. The recommendation is good, nevertheless.

The proposed revision of the "block clear" rule would forbid an operator to report a train as having cleared the block ending at his station until the train had advanced to a point in the next block so far from the signal that it would not be hit in case the fastest following train should overrun that signal. This, in automatic block territory, would be nothing more than an overlap of the braking distance of the fast train. But in order to be effectively applied to the manual block system, for which it is recommended, the overlap would have to be a full block in length and extend to the next station. The recommendation, however, is expressed in rather unfortunate terms, for it would change the present rule—which governs a condition more closely connected with operating than with signaling —so as to anticipate the overrunning of a signal. It would fail to enjoin stricter obedience upon enginemen, and instead seek to avoid the possible effects of disobedience—which it seems is the wrong way around.

These recommendations are the only ones with especial respect to the Burlington system of signaling and its method of operating. The natural conclusion, therefore, would be, that in the commission's opinion, if the present manual block system were to be completed by the addition of distant signals and the modification of the "block clear" rule it would be sufficiently safe for the handling of the enormous traffic which that road has on its main line into Chicago. But the commission goes on to say that this company has been free from collisions not because it has operated its trains under its existing block system, "but in spite of it." This characterizes as a hindrance to safe operation a block system which has been in such successful use for 20 years, that under it but one disastrous collision has occurred. If one collision in 20 years is sufficient to condemn a block system, why not also condemn the automatic block system on the Lackawanna? And if one collision in 20 years proves the unsafety and inefficiency of the Burlington manual block, on what rational ground can the commission recommend automatic stops, which have not demonstrated their fitness for preventing collisions in similar circumstances for

any considerable period at all? Surely it cannot be logical to conclude that one collision in 20 years condemns a manual block system, and at the same time conclude that no collisions in practically no experience with automatic train control demonstrates the desirability and success of automatic stops. The recommendation that automatic stops be adopted and used at the earliest possible moment, skipping over, as it does, the automatic block system, which, properly installed and managed, has been the most effective preventive of collisions, and seizing upon safeguards which have yet to be proved practicable, and, after that, desirable, in steam road service cannot be taken seriously—except, perhaps, by the busy promoters of automatic stops for stock-jobbing purposes. The *Railway Age Gazette* is not against automatic stops, but it refrains from advocating them for the same reasons that railway commissions should refrain from recommending them, except, perhaps, for experimental purposes, viz., that no device of that kind has proved its practicability by actual service tests under the varying conditions of steam railway operation, and that it has not yet been determined that it would be desirable to use automatic stops generally in steam railway service, even if they should prove practicable.

The recommendation that the flagging rule be changed to determine the minimum distance that a flagman should go back would have railways revert to the use of a rule which, after eight years of use by American and Canadian railways, was decided to be unsatisfactory. In another column appears a letter from H. W. Forman arguing against a change in the flagging rule on the understanding that the *Railway Age Gazette* favored such change in an editorial in its issue of July 26. Mr. Forman misunderstood; this paper did not in that editorial "advocate specific instructions for flagmen under different conditions," but merely that whatever the flagging rule may be, more pains shall be taken to see that it is properly understood and strictly obeyed. The original flagging rule, which was adopted in 1887 by the American Railway Association, was so framed that each road could specify the distance which its flagmen should go back. The present flagging rule, whatever its merits or demerits, was substituted in 1895 after five years of deliberation and discussion.

## ARNOLD BENNETT ON AMERICAN TRAINS DE LUXE.

THE descriptions of the service and equipment of our best limited passenger trains, as published by the railways, often stimulate expectation to a point that exceeds realization; and the traveler who pays an excess fare for special comforts and splendid surroundings may end his journey with a feeling of dissatisfaction. This feeling is not so pronounced with our own people who have grown accustomed to the peculiarities of the ordinary American sleeping car accommodations as with tourists from Europe who are accustomed to the peculiarities of their own modes of travel. Opinions as to the relative merits of the different services are usually largely results of habit and taste. A former editor of this paper, discussing the same subject, illustrated the point with a boy's opinion of goats: "Some people think they smell bad, but I think it is lovely." Much depends on the point of view.

It is seldom that an author of such prominence as Arnold Bennett has described in detail the shortcomings and minor faults of our trains de luxe, and railway managers can read with much entertainment and not a little profit his article on this subject in the August number of *Harper's Magazine*. His admiration as well as his disappointment are expressed in such forceful, yet picturesque, language that we are disposed to quote freely, while making some running comments on the opinions of this distinguished writer.

The article describes his experiences on journeys on two of the best trains in the country—the Congressional Limited from New York to Washington, and the Twentieth Century Limited from New York to Chicago. Unfortunately, the trips were made in severely cold weather when the defects of both service and equipment are most pronounced; and the defects due to this condition are those which call forth most of Mr. Bennett's criticism.

Starting from the Pennsylvania station in New York, he finds the building "full of the noble qualities that fine and heroic imagination alone can give." "There existed a railway man poetic and audacious enough to want it, architects with genius powerful enough to create it, and the public with heart enough to love it. Such a monument does not spring up by chance; it is part of the slow flowering of a nation's secret spirit." As no trains or tracks are in sight from the main waiting room, he is uncertain whether it is the tomb of our great railway president or a cathedral. Across "boundless plains of granite" he descends by a "secret staircase" and beholds the resplendent train. The steel cars are the first subject for harsh criticism. He finds they are inhospitable and do not yield; the imitation of wood in the interior finish is not a triumph of artistic propriety. Why should steel be made to look like wood, he asks. Why should it not, we ask. Cold steel may be appropriate for a boiler room or a rolling mill, but for the interior decoration of a drawing room or sleeping apartment the beautiful tones of mahogany are certainly more pleasing; and our critic admits the triumph of the imitation in the painting of the steel surfaces. The inside finish of our steel Pullman cars, which are painted in imitation of mahogany, are far more beautiful and artistic than those of any cars we have seen in England, or France, or Germany. There the soft wood finish is usually grained in cheap imitation of the hard wood, and is ugly to the extent of intolerable dreariness.

Mr. Bennett, in his technical ignorance, does not regard the steel car as fireproof or strong; "the decoration does not atone for probable combustibility and proved fragility." He is not certain about their being fireproof, but is cocksure that they are brittle. To answer this would lead us into interminable detail equal to that of the author's own "Ann of the Five Towns"; and it must suffice to say that steel passenger cars as now built in America are so much stronger, and so proof against fire (if we must use that expression instead of "fireproof"), as compared with wooden cars, that they make travel much safer and are well justified. Our steel cars are so much stronger than the best cars on any European railway, that to speak of their "proved fragility" causes the engineer to regard the expression as a piece of modern fiction.

Those martinets that we Americans call conductors, flagmen and porters now pass in review. They are "like admirals, captains and first officers pacing bridges; clearly they owned the train and kindly lent it to the railway. Their demeanor expressed a rare sense of ownership, also of responsibility. While very polite, they condescended." In trying to view the landscape our author found the tops of the windows so low that it was necessary to bend the head and crick the neck; and it must be admitted that the large, fixed windows in an English parlor car are more satisfactory.

The return trip by sleeper from Washington to New York is described in a manner which strongly illustrates the foreign point of view. He had not imagined "anything so appalling as the confined, stifling, malodorous promiscuity of the American sleeping car." It is compared with the mild horrors of Siberian prisons as described by George Kennan. The corresponding accommodation provided by European railways at a higher price places four strangers in a small compartment where all these horrors are intensified. The American only chooses to take his "horrors" in the open car with the slight privacy which the curtain provides. However, the author praises the luxuriousness and beauty of the stateroom which he occupied.

The train has not moved from the station, and the start is made by an "angry engine-driver" who sets his teeth and hisses while saying, "Now, then, come out of that, you sluggards!" There is a ferocious tug, a fearful jerk, and repeated concus-

sions throughout the night and at every station. The engineman is reminded that "the best European trains start with the imperceptible stealthiness of a bad habit, and come to rest with the softness of doves settling on the shoulders of a young girl." The soft and quiet handling of night passenger trains is an important reform which should be inaugurated in this country. Luxurious appointments are of no avail if sleep is not obtained. Rough handling is due partly to the carelessness of the engineer, but largely to the excessive weight of the cars, a burden the railways have placed on themselves, and which is now to be further increased by governmental edict. The light, little cars of European railways can be started and stopped easily, and our engineers would show a better performance, almost equal to the ideal our author describes, if their trains were as light.

The journey to Chicago was unfortunate on account of the extraordinarily severe cold weather of last winter, which made it impossible to keep the train on schedule time. It left Albany 33 minutes late, and was over two hours late before Elkhart was reached. As the dining car is attached there, breakfast was so late that most of the passengers were hungry, angry and generally dissatisfied. The cars were cold, and one noticed "the chilly, pinched demeanor of the passengers and the apologetic faces of the captains in charge." These conditions are very uncommon most of the year, but not infrequently prevailed during January and February. Would not the service be better if the schedule was lengthened by two hours for these months? There is no real necessity for the fast schedule under such conditions. Rather, there seems a necessity for a general slowing down of schedules in winter. The longer schedule is demanded in severely cold weather by matters affecting safety; for broken rails and cracked wheels increase in numbers under the combination of speed and cold; and much of the damage to track and equipment, and many resulting accidents, can be traced to high speed trains running on a frozen roadbed.

## BUFFALO, ROCHESTER & PITTSBURGH.

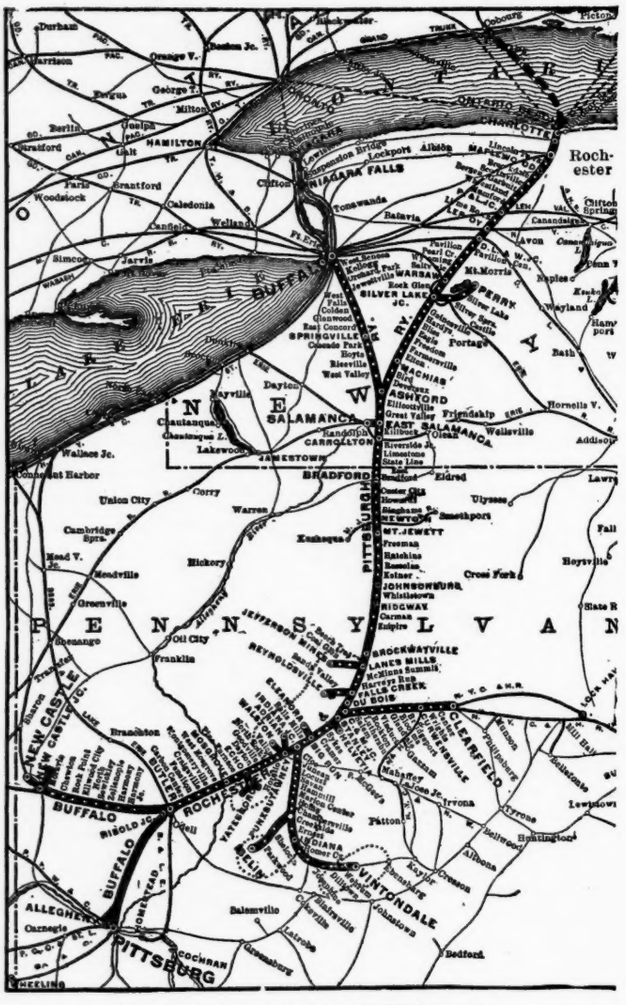
THE methods which are being put in practice in the management of the Buffalo, Rochester & Pittsburgh differ in many respects from common practice, but the financial success that has been made in the application of these principles entitles them to serious consideration. In describing the results and in enunciating the principles which govern the management of the property it is not the intention of this discussion to approve or to condemn, but to call attention to a method of railroading which has not generally been considered practicable in its entirety.

When the panic of 1907 threatened the railways of the country, the management of the B. R. & P. had the courage to rank the expedients by which the crisis might be met in the following order of desirability: Cutting dividends, saving on physical upkeep, and disturbance of organization. The common stock dividend record of the company is as follows: In 1901 and 1902 4 per cent. was paid; in 1903, 4½ per cent.; in 1904, 1905, 1906 and 1907, 6 per cent.; in 1908, 5 per cent.; in 1909 and 1910, 4 per cent.; in 1911, 4½ per cent.; and 5 per cent. in the fiscal year ended June 30, 1912, but since the close of the fiscal year the common stock has been put on a 6 per cent. basis.

In the year ended June 30, 1912, the B. R. & P. earned the largest gross, the largest net, the largest amount available for dividends, and the largest amount available for dividends per mile of road of any year in its history. The gross during this year amounted to $10,322,000, or on the 570 miles operated an average of $18,109 per mile, and the amount available for dividends per mile was $2,441. A comparison of the figures in the income account of 1912 and 1911 is given in the table at the end of these remarks. In the fiscal year just ended the Buffalo, Rochester & Pitsburgh carried 10,698,000 tons of freight, an increase of 416,000 tons, or over 4 per cent. over 1911, and since the average distance each ton was carried was 159 miles in 1912, as against 155 miles in 1911, the increase in ton mileage was 7.17 per cent., with a gain in gross freight revenue of $427,000.

The operating expenses increased in a slightly greater proportion than the operating revenue, the operating ratio being 67.74 in 1912, and 67.28 in 1911. There was, however, as has already been pointed out, an increase in net operating revenue, which amounted to about $90,000.

A road must be considered a success when it can make a showing, such as this, in the fiscal year 1912, which included a month during which coal traffic almost ceased to move, due to the suspension of mining operations. As to the methods of railway operation that lay behind this showing, it should be pointed out again here that we do not mean to imply that the policies which actuate the conduct of the B. R. & P. are not held




The Buffalo, Rochester & Pittsburgh.

to and considered by other roads, nor do we mean to imply that they can be put into successful practice by other roads. Only actual tests can determine this question. It may be that the size of the property, the personality of its president, or any number of other individual facts may apply to the B. R. & P. that apply to few, if any, other roads in the country.

The principle on which the property is managed is, in the first place, that the stockholders in the corporation do not desire returns in money that would be earned only through good business, regardless of the general welfare of the employees and of the reasonable requirements of the public served. The principle accepted is that it is better for the stockholder to suffer loss in income, which legally belongs to him, rather than the employees should have to suffer through no fault of their own, but because of general economic causes which apply to all classes of

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workers. This theory of management analyzes the causes of the present unrest and discontent, and finds its fundamental cause to be a mistaken, or at least an exaggerated, application of the "survival of the fittest" idea, and a strict limiting of the responsibility of the management to its stockholders, to the immediate present and to a *financial* responsibility.

A good illustration of the application of these theories on the Buffalo, Rochester & Pittsburgh is a system there in vogue of preparing each year a statement showing what employees have not been affected by wage increases in the past few years.

There is still a large mass of railway employees who are not organized, who have seen their fellow workers organize and demand increases and succeed in getting them on the strength, not of comparative merit, but of strength of organization. In the meantime they themselves have been passed over, or actually even have had their wages cut. It is a fact that a great mass of this class of employees have got the idea that railway companies never recognize merit as such by an increase in wages, unless some other circumstance compels them to. Whether or not this idea on the part of the office force, unskilled labor, and the lower officers, such as trainmasters, is justified or not depends largely on the policy of the individual management of the different roads in this country.

The B. R. & P. management has been definitely pursuing a policy which it believes will eventually stamp out this belief among its own employees. During the 1907 panic and the following hard year neither the shop nor clerical forces were cut, nor was there any severe reduction in time of working the force.

There is an attempt on this road to return to a simpler relation between the executive force of the road and the least important employees. There is a very determined effort to make these employees feel that they are men whose individual welfare is of actual interest to those in authority in the company.

There is an analogous policy pursued toward the general public. An attempt is made to discover the wants and demands of the public before these wants and demands are presented.

The figures in the annual report testify that this is not only theory but practice. While the average train load of freight has increased from 635 tons in 1911 to 647 tons in 1912, the average number of passengers per train-mile has decreased from 40 in 1911 to 38 in 1912, and was 44 in 1907. The mileage of passenger trains was 1,270,000 in 1911, and 1,318,000 in 1912, notwithstanding the fact that the number of passengers carried one mile decreased from 51,751,000 in 1911 to 51,101,000 in 1912. During the past year there was $634,000 spent on capital account for additions and betterments. New stations were built, or are in construction at Scottsville, N. Y., Mumford, Springville, Orchard Park and Salamanca and Ridgeway, Pa. There was $69,000 spent on automatic block signals, and 53 miles of the Rochester division are now being equipped with automatic block signals. There is in service, both out of Buffalo and out of Rochester, a motor car, which as yet must only indirectly pay through the building up of suburban territory. Certainly the stations that have been built are of size and character indicating that they are in the interest of the public rather than of revenues.

The Buffalo, Rochester & Pittsburgh is organized along departmental lines, and there is marked co-operation between all departments of the road. This may in part be due to the fact that the road is a small one, and that its organization can be more closely knit under the president than would be possible with a property three or four times as large; but whatever the cause, it is a fact.

The physical condition of the Buffalo, Rochester & Pittsburgh, which its management places next in importance to the welfare of the employees and the permanence of the road's organization, and ranks about equal with its service to the public, has been very generously maintained for a number of years. The equipment especially is in excellent condition. At the end of 1912, 90.69 per cent. of the locomotives were in service in good condition. This compares with 87.08 per cent. in 1911 There was 5.17 per cent. in service in fair condition in 1912 and 5.78 per cent. in 1911. There was out of service for repairs 2.76 per cent. in 1912, and 6.46 per cent. in 1911. The average capacity of freight cars in 1912 was 40.23 tons, and in 1911, 38.85 tons. The double-track road from Indiana Junction to Ashford is rock-ballasted, and during the past year rock-ballast has been put on nearly all of the Rochester division. Of the total 444 miles of main line owned and leased, 157 miles are laid with 80-lb. rail, 221 with 90-lb. rail, and 56 miles with 100-lb. rail.

The B. R. & P. is a heavy tonnage road, its ton-miles per mile of road being over 3,000,000. In 1912, 7,188,000 tons of bituminous coal was carried, comparing with 6,951,000 tons carried in 1911. Manufacturing, the next most important commodity, furnished 1,310,000 tons in 1912, and 1,209,000 tons in 1911. This coal originates largely in Cambria, Indiana, Jefferson and Armstrong counties, Pa.. On the greater part of this tonnage the B. R. & P. gets a haul for nearly the total length of the line to Rochester, or to Buffalo. There is a car ferry from Rochester across Lake Ontario, and considerable coal is shipped to Canada.

The following table shows the principal figures for operation in 1912, compared with 1911:

| | 1912. | 1911. |
|---|---|---|
| Mileage operated | 570 | 573 |
| Freight revenue | $8,174,728 | $7,748,179 |
| Passenger revenue | 1,058,260 | 1,065,983 |
| Total operating revenue | 9,542,368 | 9,134,402 |
| Maint. of way and structures | 1,195,263 | 1,148,663 |
| Maint. of equipment | 1,807,077 | 1,767,456 |
| Traffic expenses | 120,108 | 131,403 |
| Transportation expenses | 3,137,300 | 2,933,142 |
| Total operating expenses | 6,464,229 | 6,145,856 |
| Taxes | 204,000 | 212,000 |
| Operating income | 2,874,147 | 2,774,557 |
| Gross corporate income | 3,653,726 | 3,615,075 |
| Net corporate income | 1,770,895 | 1,709,277 |
| Retirement of equipment bonds | 250,000 | 246,500 |
| Dividends | 885,000 | 832,500 |
| Surplus | 506,330 | 495,208 |

## NEW BOOKS.

*Statistics of the American and Foreign Iron Trades.* Part I of the Annual Statistical Report for 1911 of the American Iron and Steel Association. Edited by James M. Swank, vice-president and general manager. Published by the association, 261 Fourth street, Philadelphia, Pa.

The report contains statistics of the iron and steel industries of the United States for 1911, as compared with previous years; also statistics of the coal, coke and ship building industries, immigration, etc. A chapter on Our Iron Industry and the Protective Policy prepared by Mr. Swank for George B. Curtiss' new book, The Rise and Industrial Development of Nations, is also reproduced.

*Engineering Valuation of Public Utilities and Factories.* By Horatio A. Foster. 6 in. x 9 in. 345 pages. D. Van Nostrand Co., New York. Bound in cloth. Price, $3.

The valuation of public service corporations has become so common during the recent rapid growth in the public commission control of such companies that a book outlining the principles of such valuations will be welcomed by many engineers. The author has attempted to cover the elementary principles in the present book, as the subject is too broad to be covered in an exhaustive style in a single volume. The intention has been to condense the theory and expand the practical points needed by valuation engineers. Physical and intangible values are defined and discussed and a chapter is given to the purposes of valuation. About one-third of the whole volume is devoted to the three most practical chapters on Directions and Instructions for Valuations of Tangible Property and on Forms for Use in Making Valuations. Other chapters are included on the Cost of Making Valuations, the Value of Goodwill, Going Concern or Going Value, Depreciation, Amortization, Handling Depreciation Funds, Franchise, Appreciation, Capitalization and Control of Public Utilities. Court decisions and abstracts from technical literature are used freely throughout the book to fortify statements made by the author.

# Letters to the Editor.

## ECONOMY BY OBTAINING A GREATER PAYING TRAIN LOAD.

CLEVELAND, Ohio, January 29, 1911.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

I am just in receipt of the 1911 proceedings of the Train Despatchers' Association, and I am impressed by a letter addressed to the president of the association from President Willard of the Baltimore & Ohio calling attention to what he believed could be accomplished through the intelligent direction and co-operation of train despatchers in obtaining for the railways a greater paying train load. I note that Mr. Willard's letter was not discussed until the convention was about to adjourn, and I fear that the subject did not make as deep an impression as it might had it been more fully considered.

When the subject of increased train load is discussed there is usually someone ready to tell about the bad results that obtain when freight trains are overloaded, but this is not always followed up by considering the increased freight train mileage caused by hauling trains with less load than their engine capacity. Train despatchers and others connected with train movement should ever remember that the principal factor in railroading is that of *"buying freight train mileage and selling ton per mile."* Therefore no more freight train mileage should be bought than actually needed. The merchant can buy a surplus of any commodity and perhaps not lose money, but the chief despatcher who buys more freight train mileage than needed can never use the surplus; it is an expense that cannot be retrieved.

To obtain a greater paying train load the starting point is to load all cars as much to their capacity as possible. This should be carefully checked, particularly by superintendents, train masters and agents. Then know what the capacities of engines are and require them to be in condition to haul full loaded trains (when weather conditions permit) in the direction of ruling traffic. Few roads have their traffic evenly balanced in both directions; hence, if all cars were loaded to their capacity and the maximum train load hauled in the direction of ruling traffic, the freight train mileage could be reduced to the minimum. This cannot always be done; due allowance must be made for adverse weather conditions, reduced tonnage, to high speed preferred trains, defective motive power, etc.

In order to indicate to the proper officers the surplus freight train mileage which the chief despatcher is required to purchase, he should make a daily report showing, first, increased freight train mileage due to adverse weather conditions; second, increased mileage caused by inefficient motive power, and, third, increased mileage due to other causes, such as light tonnage on account of high speed preferred trains, etc. This information can be easily compiled by the chief despatcher, since the trick despatcher, by figuring the tons lost, will know how much additional freight train mileage is caused and can mark it on the train sheet. When tonnage is lost in the direction of ruling traffic it will generally be necessary to charge freight train mileage in both directions against such adverse condition. The superintendent can show in his report, in dollars and cents, what the additional freight train mileage costs, and it may surprise some of the managers to learn the additional freight train mileage made, and its cost, each day, week or month, due either to defective motive power or to decreased efficiency of the power by lack of intelligent supervision to know that the work of both engineman and fireman is proficient.

Much mileage can often be saved by the judicious turning of freight trains in the direction of heavy traffic after they have passed the maximum grade or by using helpers over those grades. And no one has a better opportunity of estimating what can be saved by such work than the train despatcher. The traffic department should be kept advised of the extent that trains are run light of tonnage in the direction of light traffic, as it will be of interest to them to know to what extent more tons per mile can be sold in that direction without buying additional freight train mileage. The latter could not apply where the traffic fluctuates too much in either direction. It may be found that the increasing of the train load will increase the cost per train mile, but the main question is whether it decreases the cost per ton mile without unduly delaying power and cars. And beware of the man who is continually howling about overloading trains. Every intelligent transportation man knows that it does not pay to overload trains, but he also knows that nothing is more in the interest of economy than the holding of cars and trains to their capacity.

VIDI

## CARRYING OUT THE FLAGGING RULE.

NASHVILLE, Tenn., August 1, 1912.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

Noting your editorial July 26 in which you seem to advocate specific instructions for flagmen under different conditions, to attempt to augment Rule 99, or to alter the clear instructions to go back a sufficient distance to insure full protection, would, in my opinion, be taking a step backward. Any man of ordinary intelligence would know how far back to go under any and all conditions. The reason why they do not do so is not due to their lack of knowledge of proper flagging, but because they are indifferent, or are afraid they may get left. Enginemen do not call in flagmen in all cases.

After having wrestled with the problem for a quarter of a century, I have settled down to the following instructions as to the exact meaning of "proper distance" and the necessity for flagging. You are at liberty to use this lecture for the benefit of others who may care to go into the matter a little more fully; but there should be no change in Rule 99.

"By day, take with you six torpedoes and a red flag. By night, take two red fusees, a red and a white lantern and six torpedoes. Fusees are for both day and night signaling when a red flag or lantern will not insure stopping a train. They are especially useful while running and when for some reason it is not possible or desirable to drop off a man. Do not use red fusees when you wish to merely caution a train. Use the green. When you have work to do at an obscured point, stop before reaching such station and place two torpedoes on the engineman's rail, two rail lengths apart. Place them against the anglebar, so they will not be knocked off. Place torpedoes directly opposite each other when you believe one cannot be relied upon to give the stop indication. Do not give a stop signal with both the red and the white lantern held in the same hand. Swing the red lantern from one rail to the other, facing the approaching train.

"On track where there is a clear view to the rear for one mile or more, it is not necessary to go back at all until a train is seen approaching. But you must get down on the track with your flagging equipment and be prepared to go back should the engineman not acknowledge your stop signal long before reaching your train. Under no circumstances may you permit a train which you are out to stop to pass you without having one torpedo on the rail. Enginemen must be given two kinds of warning: visible and audible. One without the other will not be accepted as a satisfactory job of flagging by this company. Flagmen who fail to go back when their train is in position to be struck, will be promptly discharged. Their conductor will be suspended 30 days.

"When there is not a clear view for at least one mile to rear, go back one-fourth of a mile and place one torpedo, continue back one fourth of a mile farther and place two, then return to the single torpedo. When recalled, remove the one torpedo, or place another one two rail lengths from it, and return to your train. Never leave one torpedo alone on the rail when it is not necessary to stop a train."

Any campaign you may care to start looking to the removal of trees, small hills, etc., that will make it possible for an engineman to see farther ahead will meet with my most hearty approval. We should not impose impossible conditions upon flagmen or engineers.

H. W. FORMAN.

# CLASP BRAKES FOR PASSENGER CARS.

**Considers the Advantages of This Arrangement, Which is Now Standard on the Reading and the Central of New Jersey.**

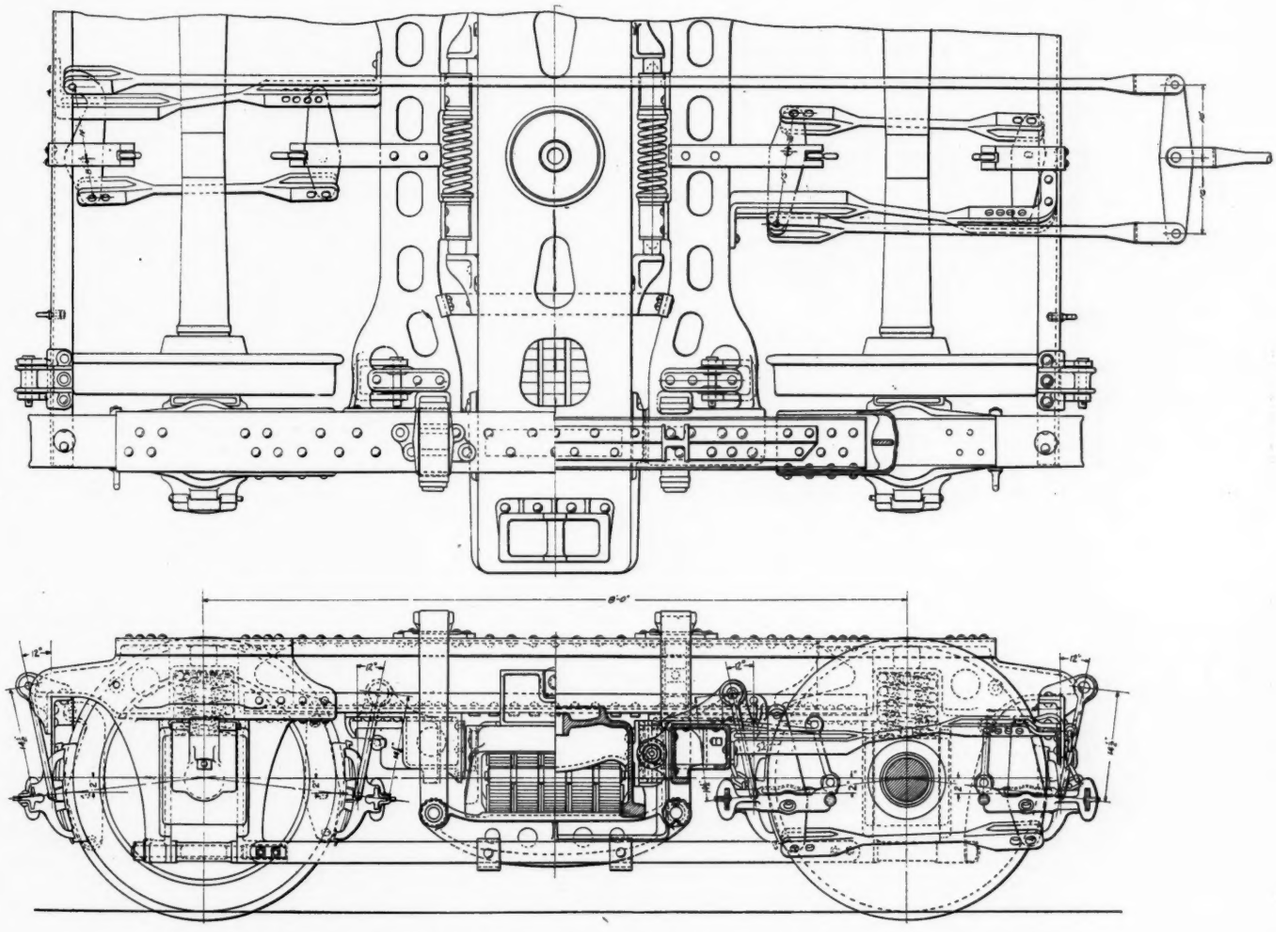
In an extensive paper on the Friction and Wear of Brake Shoes as Affected by the Wheel Load,* which was presented at the convention of the Air Brake Association last May, R. C. Augur, engineer of tests of the American Brake Shoe & Foundry Company, stated that in his opinion we were getting beyond brake shoe pressures which were good practice and that the clasp brake seems to be the most practical scheme for obtaining reasonable brake shoe pressures.

In discussing this paper T. L. Burton, of the Westinghouse Air Brake Company, formerly connected with the Philadelphia & Reading, told of the results that had been obtained with clasp brakes on the Philadelphia & Reading and the Central Railroad of New Jersey, where this type of brake is now standard on passenger cars. The first experiments were made on the Philadelphia & Reading, after Mr. Burton had witnessed the Toledo brake tests on the Lake Shore & Michigan Southern, which, in his opinion, demonstrated the necessity of using clasp brakes on heavy cars in order to stop them within a reasonably short distance. The following account of the development of these brakes on the Reading is abstracted from Mr. Burton's remarks:

The first type of clasp brake developed on the Reading was for a four-wheel truck, as shown in one of the illustrations. It consisted of the addition of two outside hung brakes. M. C. B. standard brake beams were used, having 40 deg. struts. The levers at the outer and inner pair of wheels incline in opposite directions (40 deg. from the vertical), permitting the coupling of the live levers to a short equalizing lever, which provides a desirable means of reducing the accumulated movement at the top end of the levers, resulting from shoe wear or tire turning.

The center line of the shoes is only 2 in. below the center line of the axles, which is a most desirable feature, but almost physically impossible under heavy shoe loads unless the pressures are balanced on the two sides of the wheel. With the single shoe arrangement, the brake shoe pressure tends to force the journal out of the brass, while the static load tends to keep the brass in its proper position on the journal. The ability to keep the journal in the proper position depends on the magnitude and the direction of the resultant of these two forces. With the shoe located near the center of the axle, the resultant of the two forces may not pass through the brass, or if it does, it will pass through very close to the lower edge, which results in undesirable journal troubles when operating under high brake shoe pressures. It is also inducive to undesirable wheel movement which produces excessive piston travel when the brakes are fully applied, an important factor in the efficiency of brake arrangement.

Why not locate the shoes considerably below the center line



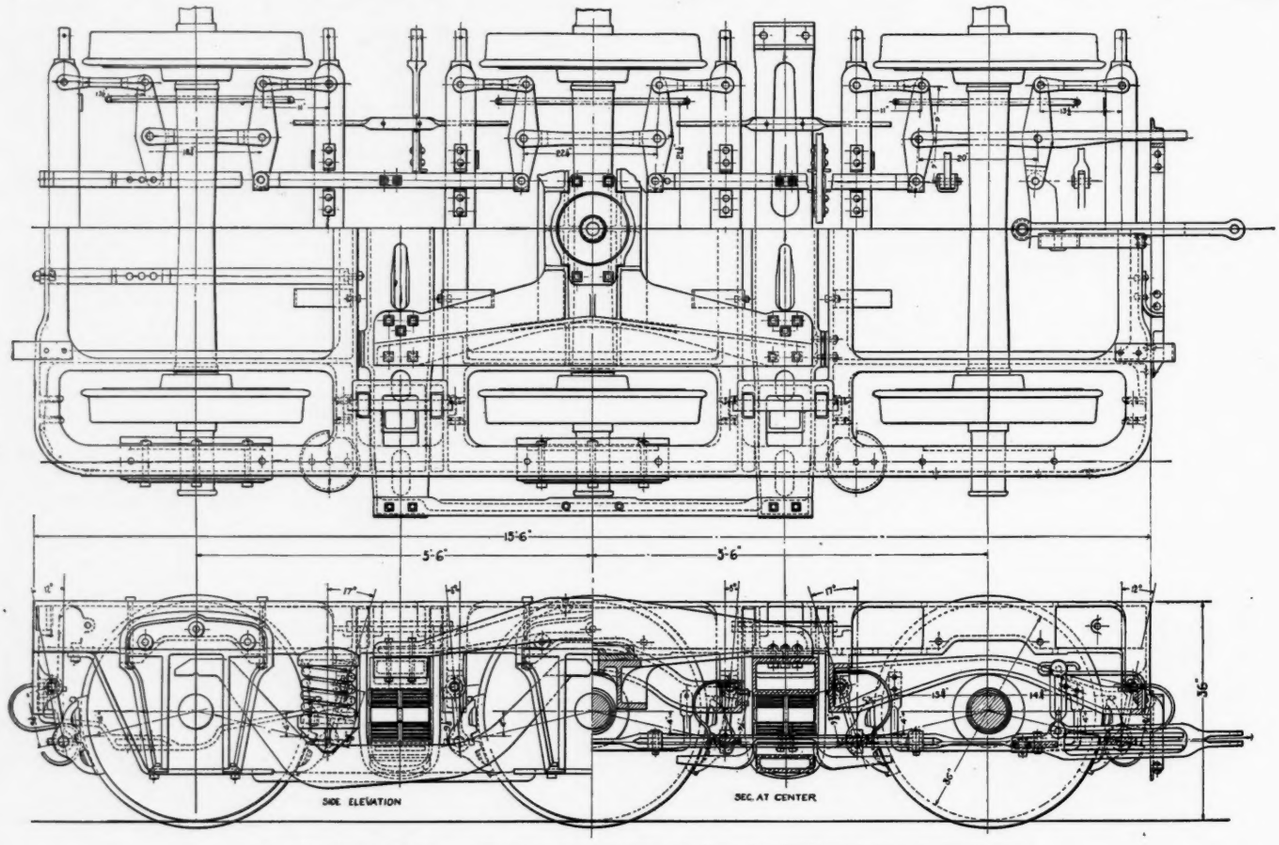
**Clasp Brakes Applied to a Four-Wheel Passenger Truck; Philadelphia & Reading.**

*Railway Age Gazette*, May 17, 1912, page 1094.

of the axle, so that the resultant of the two forces will pass through the brass at a point near the crown, and thereby avoid disturbing its relation to the journal? The objection to this was clearly brought out in the brake tests with six-wheel truck cars, having the shoes hung very low. There was a tremendous pulling down of the shoes when subjected to high brake pressures, which in turn resulted in an undesirable movement of the shoe in a horizontal direction, causing excessive running piston travel.

With the old style single brake there is a choice between two things; locating the shoes relatively close to the center line of the axle and thus disturbing the journal in its seat when operating under high shoe pressure, or locating the shoes near the rail (considerably below the axle) and disturbing the efficiency of the brake. In the two-shoe arrangement, the shoes can, so far as concerns the action of the journal and brass, be located at the horizontal center line of the axle, at clasp brakes, and with the temperature of the shoe so low at the completion of the stop that you could easily put your hands on the back of the shoes. This low temperature has resulted in a decided saving in brake shoes. When cars having the arrangement illustrated were first placed in service an accurate record was kept of the entire mileage made per set of shoes; in some cases it was as high as 25,000 miles. This was of course with double shoes, and would be equivalent to 12,500 miles for the single shoes.

It has been stated that it was almost impossible to run cars from New York to St. Louis with one set of shoes, because of the increased piston travel, due presumably to excessive shoe wear. I have seen Reading cars, operating with clasp brakes, on which the piston travel would be adjusted at the station with a service application of the brake, and then make an emergency stop from a speed of 80 miles per hour, with an average increase in piston travel of only ½ in., and that with a total




**Application of Clasp Brakes to Six-Wheel Truck; Philadelphia & Reading.**

which point they will operate at maximum efficiency. Granting, however, that the journals may be moved horizontally in the brasses, the brasses in the boxes, and the boxes in the pedestals, etc., the effect of such movement is eliminated at the brake piston when the clasp brake is used, due to the movement of one shoe being in a direction which tends to pull the piston out of the cylinder and thus increase its travel, while the shoe on the opposite side of the wheel is moving in a direction which tends to push the piston back in the cylinder, and thereby reduce its travel. The increased piston travel, due to wheel movement, commonly called "lost travel," is entirely eliminated with this type of brake gear.

At the Toledo brake tests it was observed that the shoes in many cases were red hot at the stop, and in some cases, clinkers as large as a hand and molten metal from the brake shoes would accumulate on the bottom of the car above the brake shoes during the stop. I have seen emergency stops made at a speed of 80 miles an hour with Reading cars having leverage ratio of 9½ to 1. In tests made at the same time with other cars, having shoes located considerably below the center line of the axle, and on one side of the wheel only, the emergency running travel exceeded the service standing travel by .5 in., and in some cases 5¾ in., with a total leverage of only 6 to 1. When two shoes are used on a wheel, with the same pressure on both, the total shoe loss for a given amount of work is much less than with the single shoe arrangement, where the pressure per shoe is double that of the clasp brake arrangement, and the length of the stop can be made a question solely dependent on the adhesion between the wheel and rail.

Clasp brakes were next placed on a six-wheel wooden frame truck with satisfactory results, and following this they were placed on cast steel trucks of cars weighing 185,000 lbs. This design, which is shown in one of the illustrations, was difficult to work up because of the type of car frame used in conjunction with the steel trucks. The center sills are very deep

and wide, so that on short curves there is not sufficient clearance between the sills and wheels to permit the use of a vertical lever arrangement. Placing the levers in a horizontal position brings the point of connection between the truck and brake cylinder considerably below the center line of the cylinder, so that a suitable vertical lever arrangement is provided for transmitting the force from the point corresponding to the center line of the cylinder to the pulling point on the truck. The axle driven generator interferes with such an arrangement at the generator end of the truck, and the connection is therefore made at the draft gear end. This necessitates reversing the direction of the braking force and complicates the arrangement. The increased number of parts, however, add but little to the complication provided that the weight is not increased. This is an objection that was once raised against the clasp brake in reference to pin wear and wear of levers and jaws at the pin holes, or rather the effects of such wear on shoe clearance. If the brake is properly designed, and then properly installed, the wear on the pins, levers and jaws will have no appreciable effect on the shoe clearance, and will not affect the piston travel, because if the brake is correctly designed and installed, the slack will always be on one side of the pin holes. Using nothing smaller than standard M. C. B. pins will in the majority of cases insure better bearing value than can be had with the old style of brake, which should minimize the wear of pins and pin holes. My observations of the performance of the Reading and the Central of New Jersey cars has substantiated, to a very large degree, this belief with reference to pin wear, etc. The Central of New Jersey and the Philadelphia & Reading have approximately 150 cars in service with clasp brakes, some of which have been in very hard service for approximately two years. So far, I do not believe the effect of wear on pins, etc., has been appreciably greater than with the old brake arrangement.

If the heavy cars of today are to be stopped in the distance that the lighter cars were formerly stopped, with the recognized standard brake shoes, the brake shoe load must be applied to both sides of the wheel. It is very difficult to apply a brake shoe pressure to one side of the wheel of a heavy car which will insure stopping the car in a desirable distance, i. e., the distance in which lighter cars were formerly stopped. I do not mean that the stops cannot be shortened as long as you can increase the shoe pressure to a point within the bounds of reason, but I am afraid we are going beyond the economical pressures in many cases where but one shoe per wheel is used, but if two shoes per wheel are used and they are properly located, any desirable pressure can be used that will keep the brake friction within the range of the adhesion between the wheel and rail.

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INDIAN COAL OUTPUT.—During the year 1911 the total output from the collieries in India and Burma amounted to 12,720,000 tons, against 12,050,000 tons in 1910. The shipments of Indian coal to Indian ports, principally from Calcutta to Bombay, Karachi and Madras, fell from 1,850,000 tons to 1,600,000 tons, due to some extent to coal being sent by rail instead of by sea. Shipments to ports outside of India, including Burma, principally from Calcutta to Rangoon and Ceylon, decreased from 1,391,000 tons to 1,253,000 tons. The imports of coal from the United Kingdom fell from 261,000 tons to 245,000 tons, while those from other countries rose from 54,000 tons to 73,000 tons.

NEW ARGENTINE ROAD UNDER CONSTRUCTION.—A line of great strategic importance to Rosario, has been connected between that city and Mendoza. It is to follow almost a straight line between the two cities for a distance of 650 miles. The estimated cost is somewhat over $50,000,000. Sufficient funds have been guaranteed locally for this construction of the first 32 miles, which will soon be completed in order to maintain the concessions. The further financing of the road is yet to be arranged. Besides the material for the 32-mile section, only 5 locomotives and 300 cars have been ordered.

## TAXATION IN KEITH COUNTY, NEBRASKA.

BY N. H. LOOMIS,
General Solicitor, Union Pacific.

Many a railway executive would feel that his most difficult task had been performed if he could be assured that his road had finally reached a point where a halt would be called to the heretofore constantly increasing demands of the state, county, municipal and school district authorities for heavier tax payments.

In no state has railway tax reform been more conspicuous in the last decade than in Nebraska and, indeed, Nebraska is in the main progressive; but not all of Nebraska is content with the progress achieved.

Keith county is one of the western counties of Nebraska, and is a fairly representative county of that locality. It is now in process of development. The 1910 census gave the county a population of 3,692.

The Union Pacific operates 41.52 miles of main line and 42.53 miles of branch line in Keith county. Its main line is assessed in that county at $107,500 a mile. The gross earnings from its fourteen stations in the county in 1911 were $191,300; net earnings, $76,520, including business both in and out. All the property in Keith county in 1910 was valued by the assessors at $2,022,237. The road's property in the county was assessed at $1,105,330, being 54.66 per cent. of all the property in the county.

Now, this road, whose gross earnings for an entire year in that county were less than double the assessor's value of one mile of its track there, yet paid into the public treasury 22.15 per cent. of its gross earnings and 55.38 per cent. of its net earnings for taxes. It is interesting to recall, in this connection, Minnesota's organic law levying a 4 per cent. gross earnings tax on certain of its railways.

The Union Pacific not only is assessed proportionately and actually higher, and pays proportionately and actually higher taxes, than all other property in Keith county, but it pays taxes at the rate of $11.48 per capita of population, while all other property of the county pays taxes at the rate of only $9.52 per capita. These were the figures for 1910, and they still obtain. The Union Pacific, that year, paid Keith county the respectable sum of $42,379 for taxes.

Yet Keith county is not content. Its officers have recently asked the State Board of Equalization to reconvene and reassess the Union Pacific's property in that county, raising it 60 per cent.; and if the state board does not accede to this request the county board threatens to proceed, itself, to make the new levy.

Land in Keith county sells for about $17 an acre. At least, there is a record of 17,710 acres bringing $302,474 in 1911. The Union Pacific's tracks are assessed at a valuation in that county at $107,500 per mile, although the engineers for the state railway commission's valuation department determined that the trackage, even including the new double tracks, should not have a higher physical valuation than $84,013 per mile. As showing this discrimination still further, those tracts which sold for $302,474, were turned in by the assessor as worth, for his purposes, only $83,465.

And yet Keith county demands that this railway, now paying for taxes 55.38 per cent. of all its net earnings in the county, be made to pay 60 per cent. more. The basis for this demand is found in the fact that the railway has laid a second track in the last year; but, as already pointed out, the state railway commission's own engineers have appraised this double track at only $84,013 per mile.

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BUENOS AIRES & PACIFIC RAILWAY, ARGENTINA.—This company has opened a direct line from Justo Daract in the province of San Luis to La Paz in the province of Mendoza, shortening the trans-Andean route.

# FREIGHT CLASSIFICATION ON AMERICAN RAILWAYS.

**First Article. Considers the Complexity of Those Now in Use, Their History and the Associations Which Formulate Them.**

BY WILLIAM Z. RIPLEY,
Professor of Economics, Harvard University.

Imagine the Encyclopedia Britannica, a Chicago mail-order catalog and a United States protective tariff law blended in a single volume, and you have a freight classification as it exists in the United States at the present time! A few selections from the first and last items of such a document are reproduced on the opposite page. They give some idea of the amazing scope of trade. Such a classification is, first of all, a list of every possible commodity which may move by rail, from Academy or Artist's Board and Accoutrements to Xylophones and Zylonite. In this list one finds Algarovilla, Bagasse, Pie Crust, Prepared; Artificial Hams, Cattle Tails and Wombat Skins; Wings, Crutches, Cradles, Baby Jumpers and all; together with Shoo Flies and Grave Vaults. Every thing above, on, or under the earth will be found listed in such a volume. To grade justly all these commodities is obviously a task of the utmost nicety. A few of the delicate questions which have puzzled the Interstate Commerce Commission may give some idea of the complexity of the problem.* Shall cow peas pay freight as "vegetables, N. O. S., dried or evaporated," or as "fertilizer"—being an active agent in soil regeneration? Are "iron-handled bristle shoe-blacking daubers" machinery or toilet appliances? Are patent medicines distinguishable, for purposes of transportation, from other alcoholic beverages used as tonics? What is the difference, as regards rail carriage, between a percolator and an every-day coffee pot? Are Grandpa's Wonder Soap and Pearline—in the light of the claims put forth by manufacturers, suitable either for laundry or toilet purposes—to be put in different classes according to their use or their market price? When is a boiler not a boiler? If it be used for heating purposes rather than steam generation, why is it not a stove? What is the difference between raisins and other dried fruits, unless perchance the carrier has not yet established one industry while another is already firmly rooted and safe against competition?

The classification of all these articles is a factor of primary importance in the making of freight rates both from a public and private point of view. Attention has been directed of late to its significance and importance to the private shipper, by reason of the use made of it in the advances of freight rates which have taken place throughout the country within the past decade. Its public importance has not been fully appreciated until recently as affecting the general level of railway charges. So little was its significance understood that supervision and control of classification were not apparently contemplated by the original Act to Regulate Commerce of 1887. The anomaly existed for many years, therefore, of a grant of power intended to regulate freight rates, which, at the same time, omitted provision for control over a fundamentally important element in their make-up. The Interstate Commerce Commission, however, assumed jurisdiction over the matter: and for more than 20 years, despite doubts expressed by the attorney general as to its legality, passed upon complaints as to unreasonable classification without protest even from the carriers themselves. Control over it has now been assured beyond possibility of dispute by the specific provisions of the Hepburn act of 1910.

The freight rate upon a particular commodity between any given points is compounded of two separate and distinct factors; one having to do with the nature of the haul, the other with the nature of the goods themselves. Two distinct publications must be consulted in order to determine the actual charge. Although both of them usually bear the name of a railway and are issued over its signature, they emanate, nevertheless, from entirely different sources. The first of these is known as the Freight Tariff. It specifies rates in cents per hundred pounds for a number of different classes of freight, numerically designated, between all the places upon each line or its connections. Thus the freight tariff of the New York Central & Hudson River gives the rates per hundred pounds from New York to several hundred stations, for first, second, third, etc., classes. This freight tariff, however, contains no mention whatever of commodities by name. The second publication which must be consulted supplies this defect. This is known as the Classification. Its function is to group all articles more or less alike in character, so far as they affect transportation cost, or are affected in value by carriage from place to place. These groups correspond to the several numerical classes already named in the freight tariff. Thus dry goods or boots and shoes are designated as first class. Turning back to the freight tariff, the rate from New York, for example, to any particular place desired, for such first-class freight, is then found in cents per hundred pounds. It thus appears, as has been said, that a freight rate is made up of two distinct elements equal in importance. The first is the charge corresponding to the distance; the other is the charge as determined by the character of the goods. Consequently, a variation in either one of the two would result in changing the final rate as compounded*.

A concrete illustration or two may emphasize the commercial importance of classification. So far as it may be used to effect an increase of rates, the following case is typical, as given by a Boston manufacturer, in evidence before the Senate Committee on Interstate Commerce in 1905:

"From July 15, 1889, to January 1, of this year, the classification (of carbon black, basis of printers' ink) continued to be once and a half first class in less than carload lots, third class in carload lots, approximately twice the freight required between 1887 and 1889. Meanwhile, the price had declined. . . . On January 1 the classification was again raised, to class 2, rule 25, an increase of about 10 per cent. in carload lots. Numerous efforts have been made by myself and others to have this commodity classified where it belongs, as dry color, but the only result has been the reverse of what we desired; and the industry has been and is in a somewhat precarious condition, as we have contracted for millions of pounds of black at prices fixed at the point of delivery, and had no notice of the raise in freight rate until subsequent to its going into operation."[1]

The Spokane Chamber of Commerce, in these same Senate Committee hearings, gave an illustration of the use of classification to bring about a change of rates without modifying the individual railway tariff. "The Pacific Coast Pipe Company started to make wired wooden pipe in the spring of 1900. . . . There was at that time but one factory of the kind on the North Pacific coast, located at Seattle. . . . The Seattle factory, backed by the big lumber firms on the coast, finding a serious competitor in the Spokane field, got the railways to put manufactured pipe under the lumber classification, thus reducing the rate from Seattle to Spokane from 46 to 20 cents per 100 lbs. . . . . The Spokane factory at once filed a vigorous protest, with the result that the railways put back the rate from Seattle to Spokane to 46 cents, but established a maximum rate of 50 cents for Seattle pipe, which, of course, shut off all territory east of Spokane from the Spokane factory. . . . The remnant of the Spokane fac-

*I. C. C. Rep.: 10,—281; 13,—111; 4,—32; 9,—264; 17,—511; 23,—242; 2,—1.

*Railways in the United States in 1902, by the Interstate Commerce Commission, 1903, Part II, p. 24, gives much data on changes of classification of specific articles since 1886.

[1]For the rate advances of 1900, mainly effected by this means; U. S. Industrial Commission, IX, p. 859, and XIX, p. 282.

tory . . . . has been compelled to shut down, and the entire plant is being removed to Ballard." Whether these facts are exactly as thus informally stated or not, is by the way. If not done at this time, it is certain that similar manipulation of classification rules often enters into commercial competition.

Freight tariffs and classifications are as distinct and independent in source as they are in nature. Tariffs are issued by tees, to each of which is delegated by the carriers concerned the power over classification; that is to say, the right to assign every commodity which may be shipped or received, to any particular group of freight ratings. This delegation of authority is always subject, however, to the right of filing whatever exceptions to the classification any railway may choose independently to put in force. These exception sheets contain the so-called

## EXCERPTS FROM THE FREIGHT CLASSIFICATIONS.

### OFFICIAL (Trunk Line).

| | A | Subject to Uniform Bill of Lading Conditions. L.C.L. | C.L. |
|---|---|---|---|
| 1 | Academy or Artists' Board, in cases (C. L., min. weight 36,000 lbs.) | 2 | 5 |
| 2 | Acetone, in iron drums | 3 | 5 |
| 3 | ACIDS: | | |
| | * * * * * * * * | | |
| 4 | Acetic, liquid: | | |
| | In carboys, boxed (C. L., min. weight 24,000 lbs.) (subject to Rule 27 and Note 2) | 1 | 5 |
| | In bbls. or iron drums (C. L., min. weight 36,000 lbs.) | 3 | 5 |
| | In tank cars (see Note 1) | .. | 5 |
| 5 | Boracic, in bags, boxes, bbls. or casks (C. L., min. weight 36,000 lbs.) | 3 | 5 |
| | * * * * * * * * | | |
| 7 | AGRICULTURAL IMPLEMENTS AND MACHINES: | | |
| 8 | Agricultural Implements and Machines, N. O. S.: | | |
| | S. U. | D 1 | .. |
| | K. D. flat | 1 | .. |
| | Min. weight 24,000 lbs. (subject to Rule 27) | .. | 5 |
| 9 | Axes or Hooks, Bush: | | |
| | In bundles | 1 | .. |
| | In boxes | 3 | .. |
| | Min. weight 24,000 lbs. (subject to Rule 27) | .. | 5 |
| | * * * * * * * * | | |
| 23 | ZINC: | | |
| 24 | Pig or Slab (C. L., min. weight 36,000 lbs.) | 4 | 6 |
| 25 | Plates (not Engravers' Plates), boxed (C. L., min. weight 36,000 lbs.) | 4 | 5 |
| 26 | Scrap: | | |
| | In bags | 2 | .. |
| | In bales | 3 | .. |
| | In boxes, kegs, bbls. or casks (see Note) | 4 | .. |
| | Min. weight 36,000 lbs. | .. | 6 |
| | * * * * * * * * | | |
| 34 | ZINC, SULPHATE OF: | | |
| | In boxes or kegs | 2 | .. |
| | In bbls. (C. L., min. weight 36,000 lbs.) | 4 | 5 |
| 35 | Zylonite Goods, in packages | 1 | .. |

### WESTERN.

| | A | C. L. |
|---|---|---|
| 1 | ADVERTISING MATTER, printed, N. O. S. (exclusive of signs and show cards), boxed or in bundles, prepaid (not otherwise specified) ....1 | 3 Min. wt. 24,000 lbs. |
| 2 | Advertising Matter consisting of Almanacs, Circulars and Pamphlets, for advertising purposes only and so stated on shipping ticket and bill of lading, value not exceeding 5c. per lb. and so receipted for, in bundles or boxes prepaid or guaranteed ....2 | |
| 3 | Chinese, Japanese and Palm-leaf Fans, with advertisements printed on the face, and Catalogues, boxed or in bundles, prepaid...1 | |
| 4 | Advertising Racks (sheet iron) nested solid, boxed or crated, min. C. L. wt. 30,000 lbs.....2 | .....4 |
| | * * * * * * * * | |
| 6 | AGRICULTURAL IMPLEMENTS: | |
| 7 | Except Hand: | |
| 8 | Barrel Carts: | |
| 9 | Set up, on wheels.....1½ | |
| 10 | K. D. flat .....1 | |
| 11 | Bean Pickers, S. U. crated.1½ | |
| 12 | Beet Harvesters: | A Min. wt. 24,000 lbs. |
| 13 | Set up .....1 | |
| 14 | K. D., in bundles.....2 | |
| 15 | K. D., boxed or crated.....3 | |
| 16 | Boll Weevil Machines, K. D. flat .....3 | |
| 17 | Blue Grass Strippers: | |
| 18 | S. U. .....D 1 | |
| 19 | K. D., small parts boxed...3 | |
| | * * * * * * * * | |
| 42 | ZINC: | |
| 43 | Ashes, min. C. L. wt. 40,000 lbs..4 | .....D |
| 44 | Batts or Wainscoting, enameled..2 | |
| 45 | Concentrates, in sacks, min. wt. 40,000 lbs. | .....C |
| 46 | Dross, min. C. L. wt. 40,000 lbs..4 | .....D |
| 47 | Flue dust, min. C. L. wt. 40,000 lbs. .....4 | .....D |
| 48 | Pigs or slabs .....4 | 5 Min. wt. 36,000 lbs. |
| 49 | Sheet, in casks .....4 | |
| 50 | Shavings, min. C. L. wt. 36,000 lbs. .....2 | .....B |
| 51 | Sheets, perforated for screens, boxed, min. C. L. wt. 36,000 lbs. .....4 | .....5 |
| 52 | Sheet or roll, not packed.....1 | |
| 53 | Strips (for weather strips), boxed or crated .....3 | |
| 54 | Sweepings, min. wt. 40,000 lbs... | .....E |

### SOUTHERN.

| Item No. | A | Class if Released. |
|---|---|---|
| 1 | Accoutrements, Military | 1 |
| 2 | ACIDS (Carrier's Option), viz.: | |
| 3 | Acetic, liquid, in bbls., or drums, L. C. L. | 3 |
| 4 | Same, C. L., min. wt. 30,000 lbs.. | 5 |
| 5 | Carbolic, crude, in bbls. or drums.... | 3 |
| 6 | Carbonic, liquid, in drums or tubes. | |
| | * * * * * * * * | |
| 44 | AGRICULTURAL IMPLEMENTS, C. L., owners to load and unload, viz.: | |
| 45 | Cleaners, Tobacco, min. wt. 15,000 lbs. | 3 |
| 46 | Fodder Shredders and Corn Huskers, min. wt. 12,000 lbs. | 4 |
| 47 | Fodder Shredders and Corn Huskers, in mixed C. L. with other agricultural implements, min. wt. 20,000 lbs. | 6 |
| 48 | Harvesters and Pickers, Cotton, min. wt. 15,000 lbs. | 3 |
| | * * * * * * * * | |
| 14 | ZINC, viz.: | |
| 15 | In boxes, casks, sheets or rolls | 4 |
| 16 | In blocks or pigs, L. C. L. | 5 |
| 17 | Same, C. L., min. wt. 30,000 lbs. | 6 |
| 18 | Scrap, packed | 5 |
| 19 | ZINC, CHLORIDE OF, viz.: | |
| 20 | In boxes, or in glass jugs, or carboys, packed L. C. L. | 1 |
| 21 | In kegs, or bbls., L. C. L. | 4 |
| 22 | Same, packed, or in tank cars, C. L. (see General Rule 3) | 6 |
| 23 | Zinc Ashes or Residue, L. C. L. | 4 |
| 24 | Same, C. L. | 6 |
| 25 | Zinc Dust and Zinc Flue Dust; same as Paints. | |
| 26 | Zinc Oxide | 5 |
| 27 | Zinc Paints; same as Paints. | |
| 28 | Zinc, Sulphate of, in boxes | 1 |
| 29 | Same, in kegs, bbls. or drums | 4 |
| 30 | Zincs, Battery, in crates, boxes or bbls., L. C. L. | 3 |
| 31 | Same, C. L. | 6 |

each railway, by and for itself alone, and upon its sole authority. Classifications, on the other hand, do not originate with particular railways at all; but are issued for them by co-operative bodies, known as Classification Committees. These committees are composed of representatives from all the carriers operating within certain designated territories. In other words, the United States is arbitrarily parceled out among a number of commit-

Commodity Tariffs, to be subsequently described, which stand out in sharp relief against the so-called class rates. Such exceptions are independently filed by each railway at Washington and do not generally form integral parts of the volume issued by the classification committee, except in the southern states. New editions of these classifications are published from time to time as called for by additions or amendments, the latest, of course,

superseding all earlier ones. Thirty-seven such issues have already appeared in series in trunk line and southern territory; while 50 have been put forth in western territory, since the practice was standardized in 1888.

At the present time freight classification for all the railways of the United States is performed mainly by three committees, known as the Official, the Southern and the Western, with headquarters, respectively, in New York, Atlanta and Chicago. Each of these three committees has jurisdiction over a particular territory. Thus the Official Classification prevails east of Chicago and north of the Ohio and the Potomac; the Southern, over the remaining part of the country east of the Mississippi; and the Western, throughout the rest of the United States. In addition to these three primary classifications there is also another, issued by the Transcontinental Freight Bureau, with headquarters at Chicago. This committee has supervision over classification upon Pacific coast business. A number of the states also, notably Illinois, Iowa and most of the southeastern commonwealths, promulgate state classifications having relation, however, only to local business within their several jurisdictions. These are prescribed by law and represent modifications to suit peculiar exigencies or to foster local trade ambitions. There are also a number of other co-operative local railway committees, each dealing with the special concerns of its own territory, and representing the joint interests of the railways therein included to all the world outside. Thus, for instance, Southern Classification territory is subdivided into local units known, respectively, as the Southeastern Mississippi Valley Association, the Southeastern Freight Association and the Associated Railways of Virginia and the Carolinas.* But for all practical purposes, our attention, so far as the larger problems of classification are concerned, may be concentrated upon the three principal committees above mentioned.

Some impression of the wide differences between these three main classifications in different parts of the country may be derived from the set of excerpts accompanying this article. In three parallel columns the Alpha and Omega of each are reproduced, together with bits of one of the most complicated schedules, viz., that dealing with agricultural implements. Even where the same commodities occur in each classification the diversity in description, mode of packing, carload and other requirements, renders any direct comparison almost impossible. The mere fact that the class assignment, as shown at the right in each column, happens to be the same—as in the case of acetic acid in barrels or drums which moves both in Official and Southern classification territory, third class in less-than-carload lots, and fifth class in carloads—shows nothing at all as far as equality of charges is concerned. For, as has been said, this is only half the statement of the rate. The spread between charges for different classes yet remains to be determined. The actual relativity between third class and fifth class rates, moreover, may be very different in the two places. In the New York Board of Trade case[1] this point was well exemplified. Comparative conditions as to rates in the three main sections of the country, as they then existed, were as follows:

RATES IN CENTS PER HUNDREDWEIGHT.

| | | Class. | | Canned goods. | |
|---|---|---|---|---|---|
| | Miles. | I. | IV. | L.C.L. | C.L. |
| New York to Chicago (Official class'n).... | 912 | 75 | 35 | 65 | 30 |
| Chicago to Omaha (West'n class'n)..... | 490 | 75 | 30 | 28.5 | 25 |
| Louisville to Selma (South'n class'n..... | 490 | 98 | 63 | 63 | 52 |

On the trunk lines fourth-class rates were thus less than half those charged for the first class; in the West they were even lower, relatively; while in the South fourth-class rates were about two-thirds as high as the first-class rates. These differences in the spread between classes, as will be seen, interlocking as they do with a multitude of other considerations, are a serious bar to any partial modification in the direction of uniformity for the United States as a whole. Only by consideration of every factor entering into any given rate may comparisons safely be entertained.

Historically considered, the development of freight classification has been much the same in England and the United States. Early railway practice was an outgrowth of the tariffs in force upon canals and toll roads.* In America freight charges were at the outset often arbitrarily fixed by the state legislatures, as conditions precedent to the grant of a charter. In many instances they were based upon the customary performance by wagon, distinguishing between light-weight articles paying by the cubic foot, and heavy ones for which the tariff was based upon weight. Thus in 1827 the charter of the South Carolina Railroad established its tolls at one-half the usual wagon charge. The Southern Pacific in local rates on ore into San Francisco followed along just below the charges by ox cart. The freight was proportioned also according to the length of haul by an arbitrary mileage rate. It soon developed, however, that railway rates were unique in the fact that not only was there a great increase in the volume of trade, but also in the diversity of articles offered for transportation as well. Far more elaborate classifications were soon seen to be necessary.

The South Carolina Railroad tariff of 1855, described by McPherson,[1] exemplified the primitive traffic conditions then prevalent. Goods were divided into four classes. The first consisted of articles of light weight or high value, including, for example, such incongruities as bonnets, tea and pianos; the remaining three classes paid by weight with a descending scale of charges. It is difficult to explain why coffee and sugar should be rated lower than stoves and feathers; or why dry hides and rice should be charged a higher rate than cotton yarn and bacon; but it is evident that a rough classification according to weight, value, use and cost of service was being attempted. There was in addition a considerable collection of special rates on chosen commodities according to the method of packing them, whether by barrel, bale or case. And there were also what corresponded to modern commodity rates upon cordwood, lumber, bricks and similar goods. This tariff, though primitive, including no less than 300 items, was far more elaborate than those commonly used at the time. The Louisville & Nashville originally distinguished but three classes: one by bulk, another by weight, and a third applicable to live stock. Poultry was rated by the dozen long after the Civil War, with a higher charge for Muscovy than for ordinary ducks. The traffic manager of the Chicago, Milwaukee & St. Paul testified before the Elkins committee in 1905 that the classification in Illinois in his youth was printed on the back of a bill of lading no greater than the size of an ordinary sheet of letter paper, and the page was not full.

From these modest beginnings the development of classification in the United States was rapid, responding to the ever-increasing intensity of competition and the spread of markets, particularly after 1875. By the middle of the 80's most of the large railways were working under six or eight different classifications. It began to be apparent that some check must be placed upon such increasing complexity; for conditions were intolerable. There was one set of rules for Illinois, and yet another west of Buffalo, divided into eastbound and westbound sections, with still a third on westward shipments, local to territory between Chicago and the Missouri river. The first attempt at a systematic scheme was made in 1882, but the agreements then made proved unstable. By 1887 rate conditions had become even worse, so great was the number and the diversity of the classifica-

*The Official Railway Guide of the United States gives the personnel of scores of these associations annually, with a definition of the territory of each.

[1] 3 I. C. C. Rep., 473.

*Acworth's The Elements of Railway Economics, p. 104, is best on England.

[1] Railroad Freight Rates, p. 149.

tions throughout the country.[1] Some applied to local business only, and were peculiar to each road. Some applied only to westbound business, others to eastbound traffic. The traffic manager of the New York Central & Hudson River said before the Interstate Commerce Commission that there were at one time 138 distinct classifications in trunk-line territory alone. The case of the Wabash in 1883 was typical. A shipper desiring to determine freight rates over that road might be compelled to consult a classification for the middle and western states in six classes; one for the Southern Railway and Steamship Association territory in 18 classes, one for Mississippi valley business in five classes, one known as the Revised Western in nine classes, the Trunk Line East in 13 classes, the Trunk Line West in five classes, a classification for Texas points in eight classes, and two for the Pacific coast, according to direction, in eight and nine classes, respectively. This situation, rendering it almost impossible for any shipper to determine in advance what his freight rates were going to be, as well as what his competitor was paying, early impressed itself upon the Interstate Commerce Commission. And it was doubtless due in part to its initiative that classifications were shaken down into substantially their present general form in 1888.

The natural growth of classification in a rapidly developing country, like the United States, has manifested itself in three distinct ways: there has been a steady increase in the number of items of freight separately enumerated; a growing distinction in rates between carload and less-than-carload shipments; and a steadily enlarging volume of the most elaborate special rules and descriptions. As for the mere increase in distinct commodities enumerated, in the East in 1886 there had come to be about 1,000.[1] The first Official Classification in the following year increased to 2,800 items; and by 1893, in the eleventh issue, there were twice that number. The latest Official Classification, No. 34, in 1909, contained approximately 6,000 separate enumerations—not many more, in fact, that fifteen years earlier. The point of saturation, or else the limit of human ingenuity, seems to have been about reached some years ago. The same thing was true of the Western Classification. In 1893 this contained 3,658 items, representing an increase of about 2,000 over the number of commodities classified by name in 1886. By 1909,

NUMBER OF RATINGS IN 1909.*

| | Less than carload. | Carload. |
|---|---|---|
| Southern classification | 3,503 | 703 |
| Western classification | 5,729 | 1,690 |
| Official classification | 5,852 | 4,235 |

*Railway Age Gazette,* September 8, 1911, p. 458.

as the above figures show, it comprehended 5,729, almost as many separate items, in fact, for less than carload lots as were recognized in trunk-line territory. Only in carload ratings is the Western Classification less extensive. The Southern Classification reflected somewhat simpler trade conditions prevalent south of the Ohio river, by the relatively smaller number of articles enumerated; but it should be added that the number of exceptions—filling no less than 160 pages in the latest issue—is indicative throughout of a lesser degree of standardization than is found elsewhere. Perhaps the most striking feature of the southern system is the very small proportion of carload rates. But it should be noted in this connection that the basing point system afforded preference to market towns in any event; so that jobbers in such places did not need wholesale rates to the same degree. This phase of the matter will be elsewhere discussed.

The second natural tendency above-mentioned in the development of classification is an increase in the number of separate ratings for large and small shipments. The normal growth of trade ought to make possible a steady increase in shipments by the carload, rather than by the box, barrel or case; and the increase in the number of separate carload ratings—always, of course, at a reduced rate by comparison with less-than-carload lots—conforms territorially to the growth in the volume of trade. In 1877, even in trunk-line territory, only 24 commodities were accorded a special carload rate.* By 1880 the number had increased to 50, and seven years later to 160. Just before the passage of the Act to Regulate Commerce there was no distinction between carload and small lots in 85 per cent. of the articles enumerated. A sudden change supervened in the first Official Classification issued after the federal act. The number of carload ratings was suddenly raised to 900, provoking a storm of protest from eastern shippers who resented this advantage accorded to jobbers in the West and South, inasmuch as this enabled them to buy their supplies at wholesale direct. The controversy between dealers in the older and newer trade centers came to a head in the so-called New York Board of Trade and Transportation case of 1888, elsewhere discussed. Yet notwithstanding this protest of jobbers and manufacturers in eastern trade centers, who insisted that they should be permitted to compete on even terms with provincial jobbers by making their shipments direct from New York or Boston in small lots as cheaply as the local jobber could buy them by the carload, the number of separate carload ratings steadily augmented year after year. By 1893 more than half of the articles enumerated in the Official Classification were allowed a lower rate for large shipments. Present conditions are set forth by the statistics in the preceding paragraph. From these it appears that in trunk-line territory nearly three-fourths of the commodities now enjoy carload ratings; while in the South, on the other hand, only about one-fifth of them make such distinction between carload and less-than-carload lots.[1] One reason is evident, namely, that throughout a large part of the South few jobbers command a business of sufficient magnitude to make use of carload shipments. It is but recently, to take a specific illustration, that business has developed in volume sufficient to permit of the shipment of fly paper in carload lots. Until such time no discrimination between large and small shipments could well be made.

Conditions in the West, according to these figures, are intermediate between those in the East and the South. On the other hand, transcontinental business, as carried on in competition with ocean steamers, is almost entirely confined to shipment by the carload. The Transcontinental Classification is unique, therefore, in offering but very few opportunities for shipment by package, except under specially onerous conditions. The spread, in other words, between the two sorts of carriage operate most unfavorably by contrast upon the intermountain centers. Denver, for example, under the Western Classification enjoys no carload rates, while competitors at San Francisco have a large number.[2]

An ever more elaborate code of rules and regulations having reference to local practices and conditions is the third accompaniment of the growth of trade.[3] Prior to 1887, and again before the recent revival of interest in uniform classification, conditions had become well-nigh intolerable in this regard. All sorts of details, covering relatively unimportant differences in conditions of carriage, bill of lading contracts, marking and packing, led to constant confusion and annoyance, especially in cases of shipment from one classification territory to another. An eastern shipper of iron bolts, having in mind that a gunny sack is equivalent to a box or barrel in the East, orders a small shipment in a bag to a far

[1] Cullom Committee, Testimony, p. 759.

*3 I. C. Rep., 473.

[1] Railways in the United States in 1902, I. C. C., 1903, Part 2, p. 39; In the South in 1876 only 6 per cent. of items had carload ratings; while in 1902, 65 per cent. were so favored, as compared with 82 per cent. in trunk line territory and 81 per cent. in the West.

[2] The Intermountain Rate cases will be fully discussed by the author in the *Political Science Quarterly,* for September, 1912.

[3] Samuel O. Dunn, *Railway Age Gazette,* September 10, 1909, p. 462, is best on this. Cf. 8 I. C. C. Rep., 368.

western point. He find that bolts in bags, under the rules of the Western Classification, are specifically enumerated only for carload lots, and that he must pay a rate one class higher for such shipment than if contained in a barrel, box or keg. This difference in classification may more than absorb his profit. Recent evidence before the Interstate Commerce Commission,* contained a striking illustration of such local diversity in rules and descriptions as applied to furniture.

"*Western class:* 'Bank, store, saloon and office furniture, consisting of arm rails, back bar mirrors, bottle cases, chairs, counters, counter fittings, desk, foot rails, metal brackets for arm and foot rails, refrigerators, tables and work boards. Note—Door, window and bar screens, partitions, prescription cases, patent medicine cases, show cases, wall cases, wainscoting, office railing and wooden mantels may be shipped with bank, store, saloon or office furniture in mixed carloads at third-class, minimum weight 12,000 lbs.'

"There is no such provision as this in the Official Classification. On the contrary, a shipment of that kind can only be made by figuring out the less-than-carload rate on each article, many of which take first, double first and even three times first ratings.

"For example, mirrors over five feet in length are classified double first class in the official classification, while show cases, set up, take three times first. The natural result of this difference in classification has been to shut out competition of eastern dealers in these articles entirely in western classification territory."

Only in a customs tariff of the United States would one expect to find any such complexity as is discoverable in railway documents of this sort.

The mere interpretation of such classification rules is often difficult; especially with reference to the mode of packing. Suppose a tariff provides a certain rate on stamped metal ware in boxes, barrels or crates, and furthermore fixes the charge 50 per cent. higher for shipment in bales, bags or bundles. If the consignment is encased in corrugated strawboard, which of the two rates applies? The difference in rates being so great, it becomes quite an item on a shipment of 15 carloads from Buffalo to the Pacific coast.[1] Or it may be a question as to whether a crate for Colorado cantaloupes is actually of such dimensions as to come in under a specially favorable commodity rate.[2]

The growing diversification of manufactures and trade is, of course, responsible for all three of the developments above indicated. Not only the increasing refinement of commerce, but the technical nomenclature or trade jargon, necessary for the specific and accurate description of so many thousands of articles, have conspired to render these documents extremely cumbersome in the absence of a general revision and simplification. It is but natural that one item after another should be added, each bearing a particular name or being classified upon some new basis. A striking example of this increase of complexity was afforded by the cotton goods schedule in the Southern Classification. By 1900 there were upwards of 30 different names under which cotton cloth might be shipped. Great complaint was occasioned, as well as the possibility of fraud by underclassification, etc. Most of these 30 names did not represent different values of goods, but in many instances were merely trade-marks, of particular manufacturers. At the urgent request of the shippers this complicated schedule was superseded in 1900 by one comprehensive title of "cotton goods in the piece" irrespective of color, particular method of weaving, or other subordinate details.

(*To be continued.*)

New Cuban Railway.—A subsidy bill of $1,800,000 has been passed by the Cuban house of representatives for the construction of a railway from Nuebitas, in the province of Camaguey, to Caibarien, in the province of Santa Clara. This railway will be 220 miles long and will tap the Jatibonico valley, one of the richest sugar cane zones in Cuba.

*Proposed rate advances November 29, 1910.

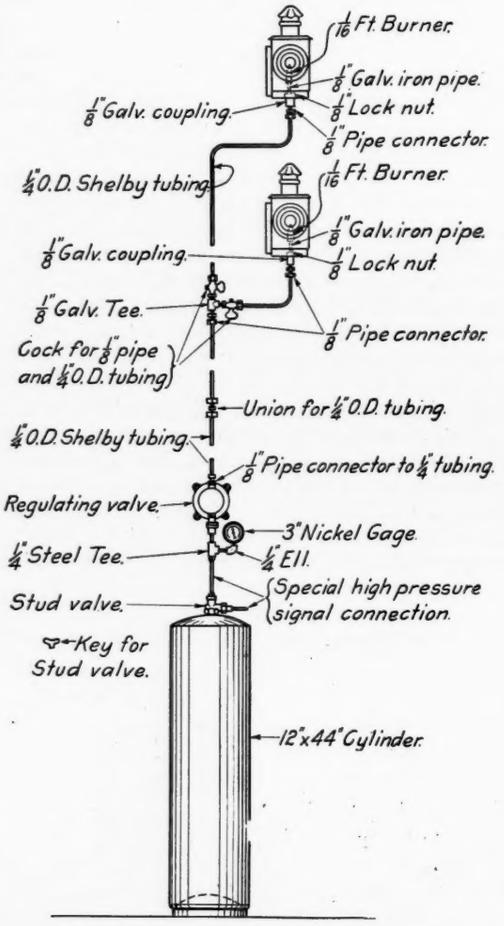
[1] 22 I. C. C. Rep., 565.

[2] 22 I. C. C. Rep., 585. Cf. also 23 I. C. C. Rep., 395, on articles too large to be loaded through the side door or too long to be loaded through the end window.

## ACETYLENE SIGNAL LIGHTS ON BOSTON & MAINE.

The Boston & Maine several years ago began the installation of 1,000 acetylene gas signal lighting equipments. A little more than one-third of these are now in service.

The gas apparatus for each signal consists of a tank, the necessary piping to conduct the gas to the signal lamps, and regulating valves and pressure gauges. The tank is a 12-in. by 44-in. cylinder, and contains enough gas to run one light continuously for 112 days, or two lights continuously for 56 days, with a margin of about 10 per cent. The tanks are all of exactly the same size, and the bottoms are concave, so that they can be dropped over vertical hooks, which hold the bottoms in place up against the mechanism case, while the tops are held by a bail,




**Details of the Tank and Pipe Fittings.**

which is forced down over the upper edge of the cylinder. The method of attachment is thus very simple, the complete operation of changing a tank requiring only disconnecting the valves—which is done by unscrewing a union—knocking up the bail and throwing the tank to one side. The new tank is put on by the simple operation of dropping it over the hook, pushing down the bail and screwing up the union.

The maintainers change the tanks according to a predetermined schedule, copies of which are given to the section men. Since the lights are guaranteed for 56 days' continuous burning, the schedules are so arranged that the changes are made at 56-day intervals without regard to how much gas may be left in any one of the cylinders. The schedules for changing are made up in the office, and each maintainer is given a copy showing him on which day his cylinders will be received, how many of them there will be, and also the day on which the 56-day period ends,

The Complete Equipment and One of the Signals.

Cover Removed Showing the Gages and Attachments.

and the day on which the cylinders must be returned to the delivery station. Each maintainer changes about one-fourth of his cylinders at a time, and he is given 25 per cent. extra tanks, so that he can make the changes as may be most convenient. Five days are allowed between the sending out of the tank from the freight house and its return to that point.

The empty tanks are all sent to the central station at East Deerfield, where acetylene gas is made for this and other uses, headlight and car lighting. The central station belongs to and is operated by the Commercial Acetylene Company, which furnished the signal lighting equipment. A "gas car" makes regular trips to East Deerfield, carrying the gas tanks. In the charging of the tanks, whatever gas remains in any of them is left there and added to until the tank is filled to the predetermined pressure.

The "gas car" carries tanks to the distributing point for each district, and from this point they go by local freight. From the freight houses the section men carry them out, as they go to work in the morning. The cost of distributing the tanks is not considered a charge against the signal department, as it is done by the section men with practically no loss of time. Soon after the empty tanks have been taken off the signals, the section men pick them up and take them to the freight house. The maintainers keep a record of the pressure of each tank when it is taken off and when it is put on.

The equipments cost about $110, complete, applied to the signal, and the cost of operation is 2½ cents per day per lamp. Lamps made by Peter Gray & Sons are used. During two winters through which these lights have been in service not a single instance of a light blowing out has been recorded.

The installations have been completed between Boston and Atkinson; Madbury and Biddeford; Boston and Rigby; and South Ashburnham and Bellows Falls—a total of 228 miles.

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Mulatos to Potosi Railway, Bolivia.—This line, which was opened to traffic on May 15, 1912, has greatly stimulated the development of the mining industry in Potosi and the surrounding country. At the present time steps are being taken to reopen mines in Potosi and vicinity and arrangements are being made for doing considerable work on new prospects. Mining machinery, tools, and supplies in any quantities can now be quickly transported to Potosi. The effect on other business in the mining regions of that vicinity. The effect on other business of the opening of this railway to traffic has also been that of increased activity, and this is especially so in regard to the import and export trade.

Indian Railway's First Quarter.—Returns of all the state and guaranteed lines for the first quarter of 1912 show that considerable progress is being made in the amount of mileage operated, earnings per mile, and in aggregate earnings as compared with last year. To the total mileage of 25,036 in 1911 has been added 353 miles, while earnings per mile have increased from $126 to $140. From January 1 to May 4, 1912, the total earnings amounted to $62,624,583, an increase of $6,143,293 over the corresponding 1911 period. That the present prosperity of Indian railways, as a whole, is shared by the systems of southern India as shown by the fact that, although the mileage of the Madras & Southern Mahratta Railway remains the same in 1912 as in the preceding year, the earnings of that line for the period January 1 to March 4, 1912, amounting to $4,157,410, show an increase of $319,739 over the earnings of the corresponding period of 1911. The South Indian Railway also shows increasing prosperity, the earnings of that road for the above-stated interval in 1912 having amounted to $2,956,623, an increase of $271,993. Surveys for the following railway extensions in this district have been completed: From Mysore to Hassam, 74 miles; Rajahmundry to Sironcha, 210 miles; Karaikudi to Amtangi, 18 miles; Surmangalam to Salem, 4 miles, and from Salem to Atur, 33 miles.

# WATER TREATMENT AND BOILER TROUBLES.

**Recommends the Consideration of Continuous Blowing-Off and Considers the Cost and Savings Due to Treated Water.**

The first part of a paper on this subject presented before the April meeting of the Western Railway Club by W. A. Pownall, water engineer of the Chicago, Burlington & Quincy, related to the usual methods of water treatment by lime and soda ash. The causes and treatment of boiler troubles were explained at length, and a by-pass system of water treatment was described and illustrated. This is an automatic treating plant with no moving parts, and needs attention for charging only every 24 hours. One of the most interesting parts of the paper relates to blowing-off boilers, particularly the amount and cost. Extracts from that portion of the paper are given below:

Where fully treated water is used and engines are equipped with a good blow-off arrangement, the boiler, if systematically blown off, can be kept in good condition and will run indefinitely without having to wash out. This has been demonstrated by tests and in practice. One division that has treated water and has given this matter considerable attention averaged for one year 4,000 miles per washout for all engines on the division.

It is, of course, not advisable to run very far without washing if the water is not treated fully and continuously enough to prevent scale accumulation. It is difficult to get out of the habit of washing engines every two or three trips, but where treatment is complete and properly looked after there is no reason for taking the water out of the boiler except through blowing off and at the stated period when the federal law says the boiler must be washed.

The mere fact that water has been treated with soda ash does not make it badly foaming water.

The amount of blowing off that has to be done to keep the water in the boiler below a foaming point of 200 or 250 parts per 100,000 depends on the amount of water used, the amount of soda ash used, and the natural alkali in the raw water. Stream waters in Illinois contain perhaps two parts natural alkali and are treated with eight parts soda ash (this corresponds to ⅔ lb. soda ash per 1,000 gallons), making a total of ten parts alkali salts per 100,000 in the water as fed to the boiler, so that when $\frac{200}{10} = 20$ boilers of water are evaporated the water will be at the foaming point, and it will be necessary to either change the water completely or do enough blowing to prevent concentration rising over 200; in this case to effect this result it will be necessary to blow away $\frac{10}{200}$ or 5 per cent. of the water used. At 15,000 gal. water used per 100 miles, this will mean 750 gal., and as a 1½-in. blow-off cock under 200 lbs. pressure will let out about 150 gal. per minute, a total blowing of $\frac{750}{150} =$ five minutes will be necessary to keep the boiler from foaming. A minute's blowing on heavy power is about 2 in. in the glass, five minutes means 10 in., and this may be done at terminals or on the road.

Passenger engines ordinarily can be blown enough at terminals to keep them in good condition indefinitely, but freight engines will have to have more or less blowing done on the road, as well as at terminals. Where heavy and frequent blowing is necessary operating conditions do not always permit blowing in time, and then the engine foams. An instance of this sort is where there is a continuous upgrade for 150 miles and the water runs high in alkali necessitating heavy blowing, and about the only time freight engines can get ahead enough on water to do the blowing is where they stop at stations. Heavier blowing out has to be done as the total of natural alkali and alkali added as soda ash is higher, and with waters on some divisions the necessary blowing would more than offset the saving in cost of washouts and advantage of not holding the engine for washout. When this limiting condition is reached it will be cheaper to change water with an occasional washout than to rely entirely on blowing out. There are worse conditions than this, for some waters will run so high in alkali that the use of an anti-foaming compound which raises the foaming point of the water to perhaps 600 parts per 100,000 is necessary for an engine to make even one round trip without foaming trouble.

The amount of coal wasted at the blow-off cock per one minute of blowing would be 50 lbs., figuring 150 gal. = 1,250 lbs. water blown out per minute and that 1 lb. of coal will heat 25 lbs. of water to the temperature of the water leaving the blow-off cock. With coal at $2 per ton and water at 5 cents per 1,000 gal. this would amount to $0.05 per minute for coal and $0.0075 for water, a total of $0.0575.

There are several objections to the extensive use of the blow-off cock on the road. In passenger service it is impractical to open the blow-off cock on the road, and in freight service it is objectionable on account of the heavy drain on the boiler in a small space of time, whitewashing company property and complaint because of noise and injury to property of people residing along the line. Where the country is fairly closely populated and in a number of towns people object so strenuously to the noise and splash of the blow-off cock that it has been necessary to issue orders not to use it at these places, the enginemen often find themselves hard put for an opportunity to blow their boilers. Blow-off boxes so located at intermediate water stations that boilers can be blown while taking water relieve the situation materially, but what promises to help solve the problem is the use of a blow-off cock with an opening so restricted that instead of a large amount of water being let out of the boiler in a short space of time the blowing goes on continuously for an hour or more as the condition demands. An opening ¼ in. in diameter will allow about 450 gallons or six inches in the glass to leak away in an hour, and this seems to be a satisfactory size for the continuous blow-off. Where the necessary blowing per 100 miles is 750 gallons the ¼-in. blow-off cock, if kept open $\frac{750}{450} = 1\frac{2}{3}$ hours, would keep the boiler in good condition without having to use the main blow-off cock at all. About the only time when it is impractical to use the ¼-in. blow-off is when the engine is working hard upgrade, and taking all the water one injector will supply; but there is usually plenty of opportunity over the division to use it all that is necessary.

The primary purpose of a blow-off cock is to get rid of the concentrated water in the boiler; the ¼-in. blow-off cock does this, and an actual test has shown that if properly located it also carries away a great deal of the suspended lime sludge. A Pacific type passenger engine with one of these ¼-in. cocks in the back corner near the mud ring and with the regular blow-off cock disconnected, so that it could not be used, made, experimentally, 10,000 miles in fast passenger service without washout or change of water. The average treatment of the water used was ½ lb. of soda ash per 1,000 gal. and the average total hardness was about 28 parts per 100,000 (or 16 grains per gal.), yet when the boiler was opened for washout it was practically clear of sludge and had only small deposits of old scale in the side water legs. The blow-off cock was kept open about two hours over a 150 mile run. Experience has demonstrated that small valves soon cut out, and the best arrangement is the ordinary 1½-in. blow-off cock with a bushing or steel nipple bored out ¼ in. in diameter.

The reason for dwelling at such length on the blowing off is that the success of soda ash treatment in a large measure depends upon it. The use of soda ash increases the foaming tendency of the water, and when the foaming point is reached, if the water is not gotten rid of through the blow-off cock it will depart by way of the cylinder and valves, causing heavy use of oil, dissatisfaction of the enginemen and various machinery failures.

For every six parts of alkali salts per 100,000 a cent's worth of coal at $2 per ton will be wasted at the blow-off cock per 1,000 gal. water used, in order to keep the water in the boiler below the foaming point of 200 parts per 100,000. An example of how the difference in cost of a bad water and a better available water can be figured is given below:

| | Analyses in Parts per 100,000. | | | | Cost in Cents per 1,000 Gallons. | | | |
|---|---|---|---|---|---|---|---|---|
| | Total Hardness. | Sulphate Hardness. | Alkali Salts. | Alkali Salts Treated Water. | Pounds Soda Ash Per 1,000 Gallons. | Soda Ash. | Coal Wasted at B. O. | Total. |
| Water in use.... | 50 | 22 | 12 | 36 | 2.0 | 2.0 | 6.0 | 8 |
| Available supply.. | 28 | 4 | 3 | 9 | 0.5 | 0.5 | 1.5 | 2 |

Difference in cost per 1,000 gallons—6 cents.

With the better water there would be a saving in cost of soda ash and coal wasted in blowing off of six cents per 1,000 gal., much less blowing would be necessary, and there would be less liability to boiler troubles if treatment were neglected or stopped temporarily.

The proper blowing off of boilers where water treated with soda ash is used is of utmost importance to avoid foaming failures and excessive use of valve oil, and it is wise to have this lined up pretty well before starting the soda ash. At terminal roundhouses there should be a place for blowing off the engine just before it goes on the clinker pit, and it is also a good plan to provide a similar arrangement on outgoing track to give enginemen an opportunity to blow off before leaving. The pipe from the blow-off cocks should be located the same on all engines, and the end of the pipe should be provided with a threaded nut to enable it to be connected to a steam hose. Then a blow-off box may be used, or where the noise or steam is objectionable the boiler may be blown through a hose into a sump. Terminal blowing may be done by hostlers or at important terminals there may be one man whose duty it is to blow a full glass of water from every incoming engine.

### RESULTS OF TREATMENT.

The advantages gained by full and systematic treatment of water are as follows:

1. Engine failures due to leaky boilers are reduced to a minimum. On divisions where soda ash treatment has been in use for several years the records show an average mileage per engine failure due to leaky flues of 513,000 miles. The total yearly mileage on these divisions is about 10,000,000, all waters are treated and most of the engines are heavy power with flues 19 ft. and 21 ft. long.
2. Much less boiler work is needed, mileage of flues between shopping is materially increased and the cost of boiler repairs is correspondingly decreased. It is not necessary to shop an engine for flues before the machinery needs it.
3. Mileage between washings of boiler is increased.
4. There is a saving of fuel due to having the boiler free from scale. Also a saving of the fuel that heats the water lost from leaking boilers.
5. Locomotives are not held out of service so much for washing out and working on boilers.

The disadvantages are the increased foaming tendency of the treated water and the waste of coal and water in blowing off to overcome this foaming tendency.

The cost of water treatment can be given fairly closely, but it is rather difficult to give in dollars and cents the various savings due to treatment. Some estimates of these costs and savings are given here as so much per engine per year.

### COST OF TREATMENT.

The average amount of soda ash used per engine per year on divisions with moderate treatment will be about 1,700 lbs., which at a cent a pound will be $17 per engine per year.

Every pound of soda ash used per 1,000 gal. of water increases the alkali salts by 12 parts per 100,000, and when 17 lbs. have been used the foaming point of 200 parts is reached and water must be blown out. Therefore for every pound of soda ash used 1/17 of 1,000 gal. of water = approximately 500 lbs. of water must be wasted at the blow-off cock, and assuming that 1 lb. of coal heats 25 lbs. of water to the boiling point at 200 lbs. pressure, it will take 20 lbs. of coal. With coal at $2 per ton this will cost two cents per pound of soda ash, or $0.02 × 1,700 = $34 per engine per year.

As each pound of soda ash used requires blowing out 1/17 of 1,000 gals. of water, 1,700 lbs. would require blowing out 100,000 gals., which at 5 cents per 1,000 gals. would be $5 per engine per year.

The cost of supervision of treatment, including chemical inspection will not amount to over $10 per engine per year and should decrease as the efficiency of keeping up the treatment increases.

Extra labor may be employed at some terminals for blowing out engines. This charge and the cost of maintaining blow-off hose at the various clinker-pits will be about $5 per engine per year.

### SAVINGS.

*Boiler Repairs.*—The saving that can be made in the cost of boiler repairs will vary for different localities and depends on the quality of the waters in use on the division. Where the waters are bad the heavy boiler work necessary means high cost of boiler repairs, and water treatment will result in a much larger saving than on divisions where the waters are of good quality and the expense of boiler work is ordinarily not high. An estimate of the average possible saving in the cost of boiler repairs, running and general, will be $250 per engine per year. This may be high under some conditions, and low for others.

*Fuel Saving.*—There are various estimates as to the amount of fuel saved by clean flues as compared to flues with scale of different thicknesses, and tests of locomotive boilers have shown a saving of 10 per cent. in clean flues over flues with 1/16 in. scale. As boilers using untreated waters start out of the shop clean, and some of the scale is continually cracking off, the average saving of fuel would probably not be as high as 10 per cent. It seems as though 3 per cent. is a conservative estimate and with an average fuel bill of $4,000 per engine per year this would amount to $120.

*Washing Boilers.*—Where waters are properly treated and engines are equipped with a blow-off pipe in the back water leg it is practical to run boilers for the month allowed by the federal law (this is true in general but does not apply to divisions where the natural alkali in the water is so high that a change in water is cheaper than blowing off). If engines receive ordinarily 40 washouts per year at a cost of $1.50 per wash or $60 total, two-thirds of this can be saved or $40 a year.

*Increased Service.*—An engine is out of service due to running repairs, general repairs and boiler washing probably 15 per cent. of the time or 54 days per year. Some of this is due to boiler work alone and the decrease in boiler work ought to cut this down by 10 days. An engine is worth $20 a day when power is scarce, but as at times of the year engines might not be needed, though available. It will be fair to estimate this saving as five days at $20 per day or $100 per engine per year.

### SUMMARY.

*Cost per Engine per Year.*

| | |
|---|---|
| Soda ash, 1,700 lbs. at 1 cent per lb. | $17.00 |
| Coal wasted (due to blow off), 17 tons at $2.00 ton | 34.00 |
| Water wasted, 100,000 gal. at $0.05 per 1,000 | 5.00 |
| Supervision of treatment | 10.00 |
| Blowing at clinker-pit | 5.00 |
| Total cost | $71.00 |

*Saving per Engine per Year.*

| | |
|---|---|
| Boiler repairs | $250.00 |
| Fuel, 3 per cent. of $4,000 | 120.00 |
| Washing boiler | 40.00 |
| Ten days' extra service at $10.00 per day | 100.00 |
| Total saving | $510.00 |
| Net saving per engine per year | 439.00 |

The above estimate shows a net saving per engine per year of $439, and when multiplied by a large number of engines this amounts to a great deal of money. Another saving that is not estimated is the saving in delay to freight and the cost of sending out another engine and crew to haul in a train whose engine has died on account of leaky flues.

In conclusion, it is necessary in order to prevent boiler troubles and insure getting results from water treatment to:

1. Secure the best available supplies.
2. Line up enginemen and terminals to blow off boilers systematically and sufficiently to keep ahead of foaming troubles.
3. Give all waters containing sulphate hardness the necessary soda ash treatment and provide enough chemical inspection and general supervision to keep the treatment full and continuous.

Soda ash treatment has been condemned and abandoned because of foaming troubles or failure to stop boilers leaking, and I wish to emphasize the importance of blowing off, the remedy for foaming, and of giving the treatment enough attention to keep it full and uninterrupted. If these things are done the treatment will pay large returns and will be well worth while.

## ILLINOIS COMMISSION REPORT ON BURLINGTON COLLISION AT WESTERN SPRINGS.

The Railroad & Warehouse Commission of Illinois has made public the results of its investigation, on July 23 and 24, of the rear collision between passenger trains Nos. 2 and 8 on the Burlington, near Western Springs, Ill., about 6:40 a. m. on July 14, 1912. Fifteen witnesses were heard, including F. C. Rice, general inspector of transportation, and J. B. Latimer, signal engineer, who did not testify at the coroner's investigation.

In its report the commission describes the manual block system which has been in operation for the last 23 years on the Burlington, between Burlington and Chicago, showing that it does not call for written orders except on special occasions, that it provides that operators shall communicate with each other as to the condition of the block, and that there must always be a clear block as to passenger trains. Under the rules no passenger train must be admitted or allowed to follow any other train into a block, and no other train is permitted to follow a passenger train into a block. The only obligation upon the operators is to keep the trains apart, and the method used for communication between block stations is the telephone.

The circumstances leading up to the accident are then described in detail, the description being based upon practically the same testimony as was given at the coroner's inquest, and published on page 174 of the *Railway Age Gazette* of July 26.

The commission finds that some of the many contributing causes of this accident reach much farther than the immediate action of any person directly connected with the several trains at the time. From a careful study of this and similar disasters in recent years the commission has decided that the following are the most important of those underlying causes:

(1) The demand which the general public makes upon the railways for through trains that will run from one large city to another with but few stops and at a rate of speed which is admitted to be dangerous to the traveling public as well as to employees. The public demands the service and appears to be willing to take the chance, and the railways must respond in order to hold their patronage and meet competition.

(2) The effect of this same public demand for fast service upon the government, which, in making its schedules for the carrying of mail, requires fast schedules and permits its own employees and those of the railways to run the risks incident thereto.

(3) The effect of the demands of the public upon the railways, which has led to the practice of running fast trains very close together under conditions in which the best equipment and the best management are not able to prevent accidents if anything goes wrong.

The commission believes that even though engineers are fully aware of the rules, they know also that strict compliance with them would delay the train; and, following an unwritten rule, and the general expectations of the officials of the road that time is to be made if possible they take the risk of running fast. The flagman, also, understands that if he is back a great distance when called in he will delay the train, and, in order to avoid this, he takes a chance in not going back far enough to insure full protection.

With respect to Rule 99 the commission believes:

"That this rule should be amplified and enlarged, and that a definite rule should be made governing the flagman and directing more specifically what he should do under conditions similar to this case. It would be a better and a safer rule if the officials of the road, with their much wider experience than any flagman can possibly have, would determine the minimum distance that the flagman should go back and state specifically the other precautions he should take."

In calling attention to some of the immediate contributing causes of this incident the commission states that Mrs. Wilcox, the operator at Western Springs, did not violate any instructions or rules, and finds that her misunderstanding as to train No. 4, while it may have been the first contributing cause of the accident should not have caused a collision, and of itself would not have done so. Five men are found to have been at fault—the three enginemen who overran the stop signal; the conductor of train No. 2, who, so far as the records show, seems to have made no effort to protect his train or to get authority to proceed; and the flagman, who did not use due diligence in going back to protect his train.

With respect to accidents in general the report says:

"While investigations of accidents have heretofore been confined to the one accident and the immediate cause thereof, no permanent or good results follow such investigations. It is of little value to the public or assistance to the road to criticise some one individual for an error in judgment or a failure to perform a specific duty. These things should not be minimized, but the time has arrived when we should go much further into these accidents, determine if possible the real causes, and devise some plan of operation and protection to prevent them."

The report then takes up the general subject of automatic and manual signals; describes in detail the method of operating between Chicago and Aurora on the Burlington; and gives comparative costs of automatic and manual signals, based on an estimate covering 155 miles of track and showing that the manual signals cost 60 per cent. more than the automatic to operate and maintain. These figures are submitted as tending to show that it was not a matter of expense which caused the C. B. & Q. to decide to extend its manual block system in preference to installing an automatic block system.

The argument in favor of the manual block system, that the presence of the operator has a moral effect on the enginemen tending to make them more careful and observant, is discussed and compared with the arguments in favor of automatic signaling. The block signal system on the Burlington is found to be weak insofar as no distant indications are given at block entrances. Referring to the fact that there have been so few collisions on the Burlington the commission says:

"That the Chicago, Burlington & Quincy has had remarkable success in the operation of its trains under the present block system, especially on the division between Aurora and Chicago, must be due to the extraordinary

discipline maintained, the exceptional character of its employees, and the close supervision of its officers. Aside from the train accident in question, it would seem that this company has been free from collisions, not because it operated its trains under the block system which could not be considered as being sufficient for the purpose, but in spite of it. Respecting such changes as can be made in the present block signal system in use in the shortest time possible, it is our recommendation that distant signals be intalled in connection with each home signal in order that indication may be had of the condition of the block in advance. Under certain atmospheric conditions the use of the distant signal is absolutely necessary. Safety in the operation of the manual block signal might be still further amplified by the use of lock and block machines as one step, and by the introduction of track circuit as a second step, but the practicability of this would depend on many factors."

With reference to the operating rules the commission recommends that no operator be permitted to report a train as having cleared his section unless he knows that the train has advanced to a point in the block ahead far enough away so that it would be possible to stop a following train running on a fast schedule without danger of its colliding with the train in advance. The present rule permits the block operator to say that a train has passed out of the block when its rear-end is 150 ft. beyond the block signal.

In reference to accidents in general the commission notes that the Block Signal and Train Control Board reported in effect that automatic control of trains was practicable, and proceeds:

"Considering the volume of traffic handled, and the speed of the trains, it seems to us that the human factor should be assisted as much as possible with automatic appliances that will apply the train brakes automatically in case of failure to understand, comprehend and obey signal indications. It will not do for the railways to say off-hand that automatic control of trains is impracticable when they have made no earnest effort to make use of such devices as are available. Such devices are in use on the lines of the Washington Water Power Co., the Pennsylvania Railroad in New York City, the Hudson & Manhattan and the Erie, and there is now an installation on the San Francisco, Oakland & San Jose Railway. It is, perhaps, too much to say that every automatic stop device on the market could be made use of without some development in actual service, but it is apparent that if the railways would use the same energy in developing automatic control devices, as in the case of automatic couplers, train brakes and block signals, and make use of their devices, such accidents as occurred on the line of this road at Western Springs would be practically impossible.

"Regardless of the character of the block signals in use, provided, of course, it is a system under which trains can be moved expeditiously, it is our judgment, that it is incumbent upon such roads as handle traffic in character and volume similar to that handled by the Chicago, Burlington & Quincy, to make every effort to adopt and make use of, at the earliest possible moment, devices which shall have for their object the automatic control of trains in order that employees who man the trains and the traveling public may be carried in safety." . . . "If a school of instruction in relation to the rules, their meaning, and the importance of carrying them out in detail, also the responsibility of all persons in every department connected with the operation of railways, was organized by the several roads, and a reasonable time and opportunity given all employees, and their attendance required, this, with the hearty co-operation of both management and employees would, in our judgment, materially increase the efficiency of the entire service and reduce the number of accidents to a minimum.

"The principle of conservation of lands, waters, forests, and mines, which has in recent years taken such a hold on the public mind, should now be extended to the conservation of human life. When the general public, together with the stockholders, directors, and all railway authorities, put the conservation of human life first, and the rate of speed second, we will have taken one long step in advance."

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New Chilean Railway.—Plans for the Chucumata railway have been approved by the Chilean government. Large quantities of nitrate for export will be shipped to Iquique over this line.

Coal Consumption by Indian Railways.—The total quantity of Indian coal consumed by railways during 1911 increased from 3,800,000 tons to 4,220,000 tons; and the amount of foreign coal consumed by Indian railways decreased from 52,000 tons to 32,000 tons.

Chilean Railway Statistics.—In 1911 there were 1,657 miles of railways in operation in Chile. The number of passengers carried over these lines during that year was 10,836,605, and the number of tons of freight transported was 4,489,205. The gross receipts of the railways in 1911 were $10,548,795.

## NEW SIGNAL RULES ON THE NEW YORK CENTRAL.

New rules governing the operation and use of the interlocking, block and special signals on the New York Central & Hudson River, went into effect on February 1, 1912. Both the rules and the form in which they are published embody some advanced ideas of special interest. A number of new and important definitions, a simplified presentation of the signal aspects and their indications, and a complete rearrangement of the rules under the various headings are the principal features of the new rule book.

Among the new definitions is that of the term "caution signal," which is defined as "a signal indicating proceed with caution, continue with caution, or proceed at slow speed prepared to stop." This definition clearly expresses the distinction between this signal and the distant signal—two signals, the functions of which are often confused, principally on account of a lack of explicitness in the explanations of their uses. Under the new rules a distant signal is not a caution signal. The distant signal means "proceed prepared to stop at the next signal"—the point of stopping, but not the point of beginning to stop, being definitely fixed. The caution signal does not fix the point of stopping, but establishes definitely the point of beginning to proceed with caution, under control, and prepared to stop—the place of stop being any place short of the train or condition of the track which has caused the caution signal to be displayed. A distant signal does not protect a train between itself and the home signal. No more does a caution signal signify anything with respect to the signal in advance. A one-arm three position automatic block signal, with the arm in the 45-deg. position is a distant signal—it does not give permission to enter an occupied block. This is not essentially different from the practice on most roads, but it is different from that on some roads where the limitations of the distant signal are not so clearly defined. It is also the correct use of two terms which are often wrongly used interchangeably, perhaps on account of the somewhat general impression that all signals that do not indicate stop or proceed are caution signals.

The definition for "in advance of a signal" is, "the section of track occupied by a train that has passed the signal"; and that for "in the rear of a signal" reads, "the section of track occupied by a train before it passes the signal." These are the generally accepted meanings of these terms, although literally speaking, a train that has not yet passed a signal is really in front of the signal itself. These terms, however, are given the opposite meanings in the rule book of one of the large roads in the middle west.

Following the definitions, there are three pages devoted to types of signals, which include semaphore, disk, pot, ball, and flag signals of special form. This section contains a picture, in colors, and a short description, of each of the 12 types.

The signal aspects are not described, as in many rule books. They are merely named, and the name in each case is the indication. All of the signals that mean the same thing are grouped together. Thus Figs. 1 to 28, inclusive, have the caption "Indication—Stop"; Figs. 29 to 36, inclusive, "Indication—Stop and Proceed"; Figs. 37 to 56, inclusive, "Indication—Proceed"; etc. There are 19 different indications, and the section devoted to signal indications contains 24 pages and 130 illustrations of aspects in colors.

The scheme of grouping and naming the aspects, without describing them, does away with the necessity for a lot of useless remembering on the part of the trainmen. They are not compelled to keep in mind the descriptions of the aspects, but can put the emphasis on the picture and its meaning. The examiner will get a quicker response to a question as to what a picture of an aspect means than to a request for an explanation of the appearance of a signal when it gives a certain

indication. This is in keeping with what is expected of the trainmen on their runs, for they do not translate a picture into words and then act on it, but omitting the intermediate step, they go instantaneously from the picture to the action it calls for. The omission of the intermediate step from the rule book is a decided advance, and helps rather than hinders the association of the visual image with the indication.

Another noticeable omission is that of the customary reference to the locations of signals, such, for example, as the statement to the effect that signals are usually located to the right of or over the tracks they govern. When the rules provide for certain locations in this manner, a signal in a special location, such as on the left side of the track where the view on the right side is obstructed, is usually bulletined. Bulletins such as these, however, are not in strict accordance with the rule book, or, at least, are exceptions to it. Their effectiveness decreases rapidly, and they are usually either destroyed, disregarded, or displaced, within a month or so. But the signal stands and the rule book still remains in force; and the inconsistency between the description of the location in the book and the actual location on the ground is apparent long after the bulletin is forgotten. The plan of bulleting all locations, and leaving references to them out of the rule book appears preferable to that of constantly superseding the rule book by special bulletins covering conditions which it would be impracticable to make provision for in the book.

Rules 600 to 664, which comprise the fourth section, are general signal rules, and include all rules which are common to interlocking, manual and automatic block, and switch and special signals, the special rules for each of these being grouped in the following sections. Some of the general rules are interesting. Rule 615, for example, says:

> "Should an improper proceed signal indication be observed, it must be reported on form S. C. 1, and also to the general superintendent by wire from the first open telegraph office, and a man must be left at the signal to notify approaching trains that would be governed by such a signal of the improper indication, until relieved by a representative of the signal department or by instructions from the superintendent."

This rule covers an improper proceed signal on either track, and extends to all trains. If the engineman of a mail train, for example, should see a false clear signal on the opposite track he would have to stop and leave a man at the signal as provided by the rule. Rule 627 provides that:

> "The use of block and interlocking signals and the rules governing same, do not relieve employees in the train service from the duty of promptly and properly protecting their train."

Rules 700 to 727 are for interlocking signals; 800 to 850 for controlled manual block signals; 900 to 960 for manual block signals; 1000 to 1010 for automatic block signals; and 1100 to 1105 for switch and special signals. Rule 1003 reads:

> "On single track, where automatic positive stop signals have a square-end arm, and at night two lights arranged vertically are used, a signal indicating stop must not be passed until a flagman has been sent forward to protect the train to the next signal in advance."

This rule was put in the book to cover the practice followed on the only stretch of automatically signaled single track on the New York Central. This is 2½ miles long, and lies between Salina Junction and Syracuse, N. Y., on the Ontario division. The signals for one direction are all provided with square-end blades with two lights at night arranged vertically, and the signals for the other direction have pointed-end blades and diagonal lights. Under rule 1103 a train stopped by a signal having a square-end blade may proceed only under flag protection, but, by Rule 1004, if stopped by a signal having a pointed-end blade, it may proceed at once but must run cautiously, expecting to find a train, open switch, broken rail, or other obstruction in the block. This avoids the delay of flagging through the single track block in both directions, as only one train has to flag, the train in the opposite direction having but to proceed with caution.

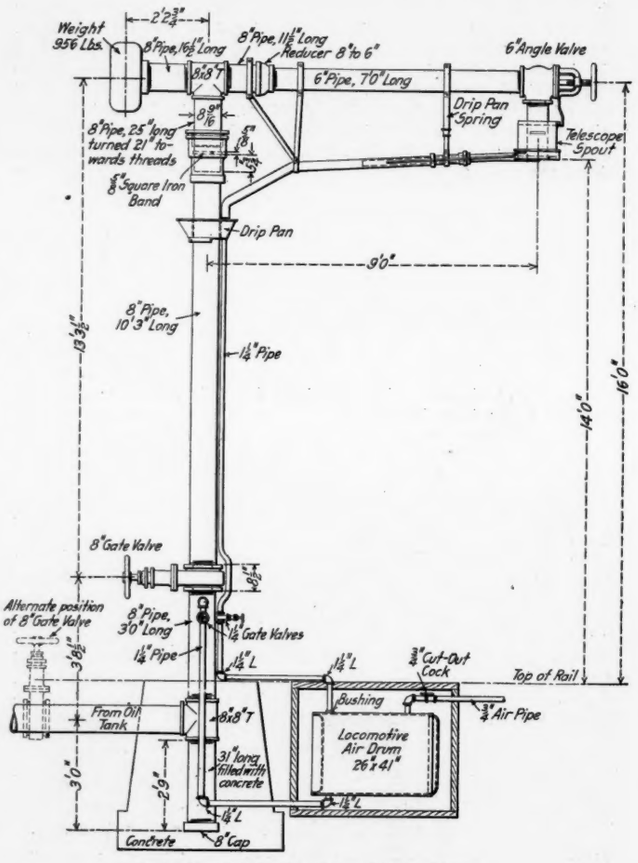
The controlled manual rules comprise 30 of the 96 pages in the book, and cover existing installations which it is proposed to replace in the near future by automatic signals. A good many of the aspects representing signals which are being superseded will also be eliminated from the rule book within a few years.

On the Grand Central Terminal and the Electric division a bulletin was issued to explain to the men who use the book of rules that only a very limited number of the aspects contained in it and a very limited number of the new rules are required, on account of the fact that practically all of the older types of signals have been eliminated from that territory.

## ROSE OIL COLUMN FOR FILLING TENDER TANKS.

BY C. S. GREEN.

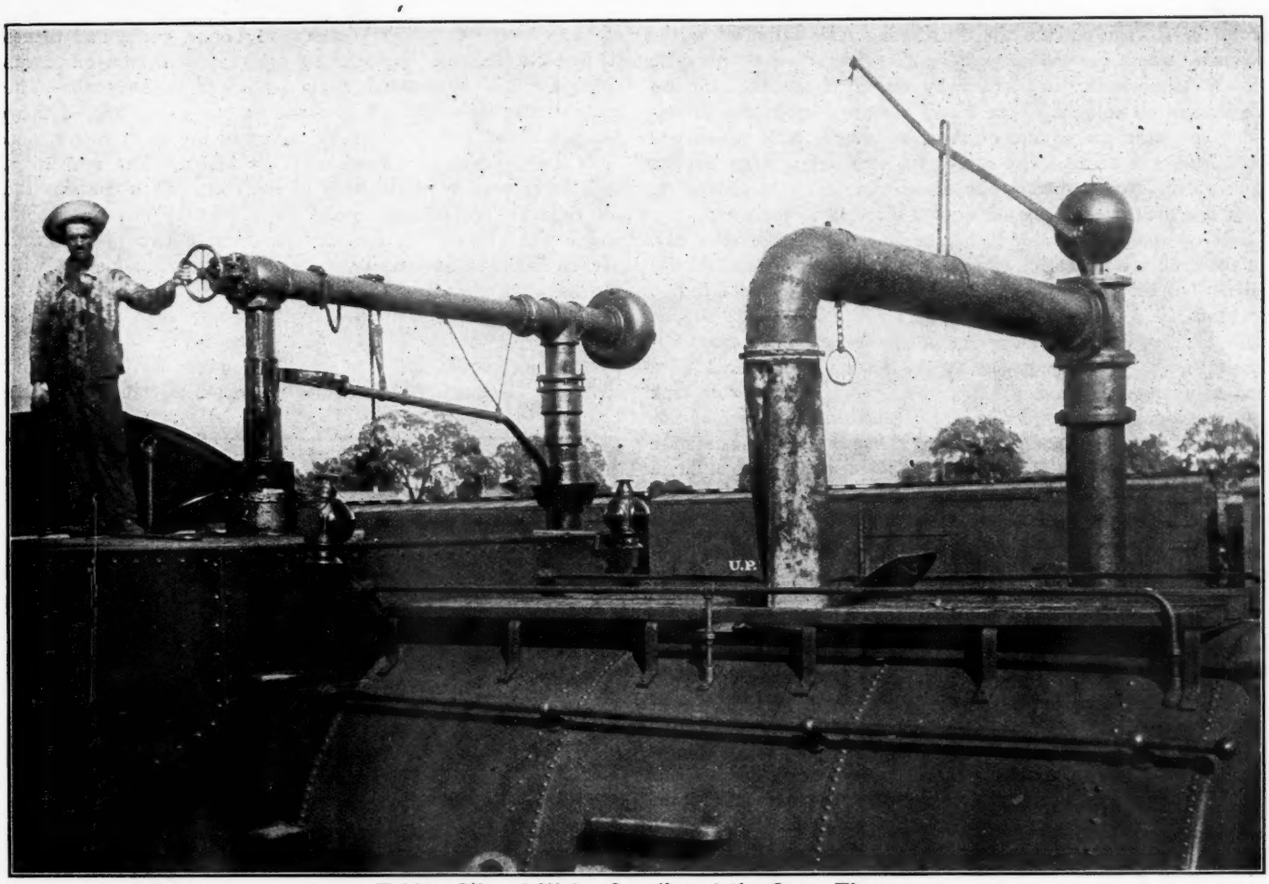
One of the troublesome features connected with the oil supply to oil-burning locomotives is the leakage which takes place at the ordinary oil column or crane, and the Rose oil column here illustrated has successfully overcome this. It provides a clean method of handling the oil and was designed and patented



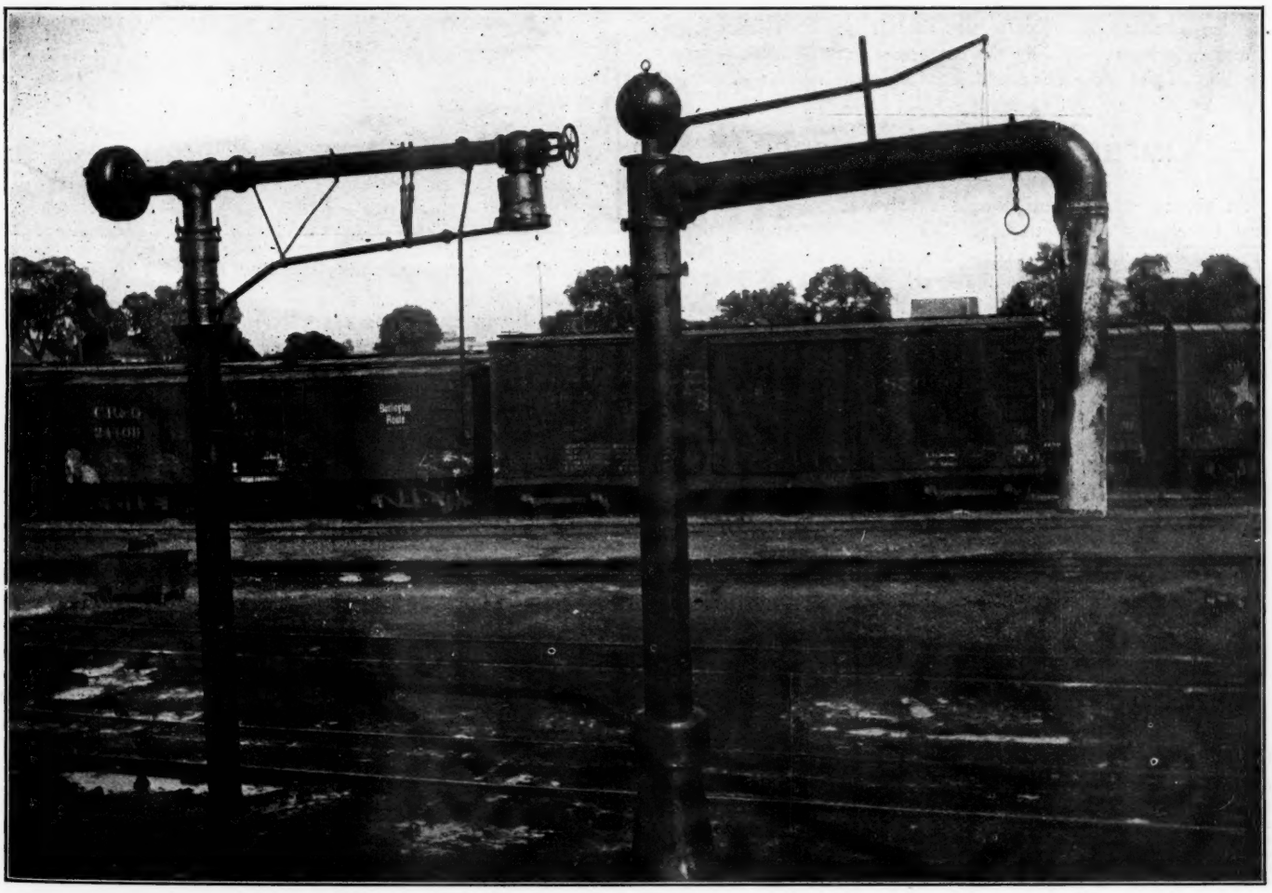

**Details of 8-Inch Rose Oil Column.**

by W. M. Rose, foreman of water service of the Sacramento division of the Southern Pacific. The average locomotive oil tank on this division has a capacity of 2,500 gal., and an average run of 130 miles uses 1,500 gal. of oil. A barrel of oil containing 42 gal. now costs 82 cents, and four barrels of oil are equal to one ton of coal.

The handling of oil from the tank car to the storage tank,




Taking Oil and Water Supplies at the Same Time.



Relative Position of Oil Column and Water Column for Filling Tender Tanks.

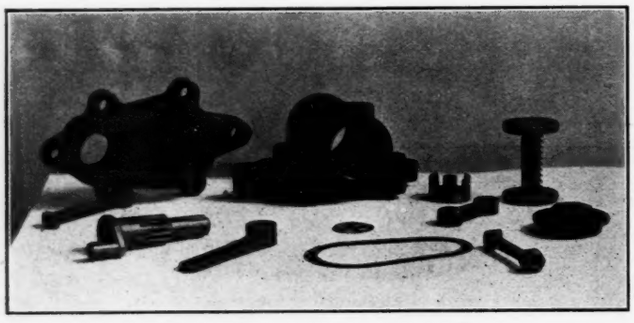
from the storage tank to the distributing tank and then to the columns, where the oil is taken on the locomotive at the same time it takes water, is all done by means of the Rose oil unloader and oil column. Spur tracks are provided at the oil stations and near the middle of these a sump is built which will hold 1,500 gal. of oil. The reason for this is that after the car tank valve is open difficulty is sometimes found in closing it; with this arrangement the oil flow is directed to the sump.

The oil stations are able to handle about 25 cars of oil a day. In the ordinary California climate it is not necessary to heat the oil until it reaches the distributing tank, and it is there heated to about 90 deg., and is then ready for the locomotive supply. This renders it unnecessary for it to be heated in the locomotive tank. The equipment at the oil station consists of a duplex plunger pump, a 100 h. p. boiler, a 500 gal. water tank and a 400 gal. oil tank placed near the boiler. The cost of this equipment of boiler, pump and pump house is $2,000. The large oil storage tank costs $5,000, and the Rose oil column outfit in place costs $300.

The oil column is arranged something like a water column, but it is made of 8 in. vertical pipe with a malleable iron swivel gland near the top and a 6 in horizontal pipe with an angle valve at the end. The vertical pipe is embedded in a concrete foundation and has an 8 in. gate valve near the bottom. The particular feature of this column, which eliminates leakage and waste of oil, is the telescope spout which is placed under the outlet as soon as the angle valve is closed. The remaining drip is thus caught, and is carried down through a 1 in. pipe to a small tank which is usually a locomotive air reservoir, 24 in. x 41 in., enclosed in a box directly under the surface of the ground. This tank has three connections, one admitting the oil which leaks from the column spout, another for a 1 in. pipe connected to the bottom of the tank and to the vertical oil pipe, and a ¾ in. pipe connected with the compressed air line. When the tank is nearly filled the 1 in. gate valve in the vertical drip pipe is closed and the valve connecting to the 8 in. column is open. Air is then admitted to the tank and the oil is forced from it into the main column. Usually the compressed air is taken from the air line of the locomotive which is taking oil.

## IMPROVED BLOW-OFF COCK.

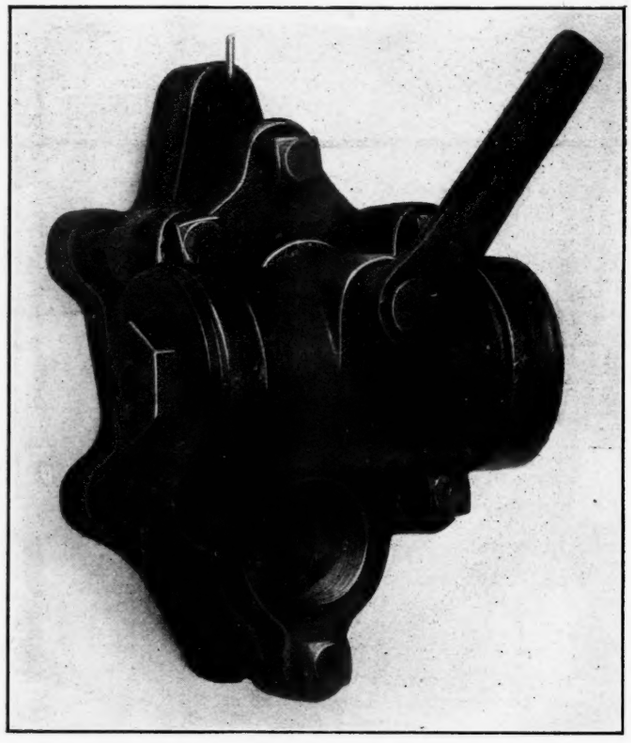
At the recent convention of the International Railway General Foremen's Association, at Chicago, J. W. Anderson, general foreman of the Chicago & North Western, at Boone, Iowa, directed attention to the excellent results which are being obtained on that road by the frequent use of blow-off cocks. One of these is placed on each side at the corner of



**Details of Osmer Blow-Off Cock.**

the mudring and the engineers have been known to open them as many as 200 times in 150 miles. The valve is opened just long enough to blow off the small amount of mud that collects near it.

The air operated blow-off cock, which is shown in the illustrations, has been patented by J. E. Osmer, master mechanic of the Chicago & North Western, at Boone, Iowa, and makes it possible for the engineer to open several blow-off cocks simultaneously by operating an air valve in the cab. The body of the blow-off cock is made in two parts, one of them being fastened to the boiler by means of the short nipple, and by a stud, which is tapped into the boiler. The remaining, and larger portion of the body of the cock, which contains the air cylinder, is fastened to the other part by means of bolts and a flat gasket. In the air cylinder are two pistons with packing rings, connected by a bar or rack which meshes with the teeth on the drop forged crank shaft. The crank at the end of the shaft is connected to the bronze slide valve of the blow-off cock by means of a link. The valve may be opened by allowing air to enter at one end of the air cylinder and is closed by allowing air to enter the opposite end. The valve



**Osmer Pneumatically Operated Blow-Off Cock.**

may also be operated by a hand lever on the end of the crank shaft in case the boiler washers have occasion to open or close it when emptying or filling the boiler. The air cylinder of the valve illustrated has an inside diameter of 2½ in., and has been successfully operated with 90 lbs. of air on a superheater locomotive carrying 170 lbs. of steam.

ROLLING STOCK ON INDIAN RAILWAYS.—During 1911 the additions made to the rolling stock of Indian railways consisted of 222 locomotives, 1,039 passenger cars and 3,485 freight cars. Since the first of the year the purchase of 34 locomotives, 199 passenger cars and 1,044 freight cars has been authorized. During 1911, 435 locomotives, 1,131 passenger cars and 8,002 freight cars were fitted with automatic brakes, bringing the total number so equipped at the close of the year up to 5,713 locomotives, 17,462 passenger cars and 56,721 freight cars. This compares with 1,702 locomotives, 3,944 passenger cars and 94,608 freight cars not equipped with automatic brakes. In the same year 1,324 passenger cars were fitted for gas or electricity, making the total number so fitted at the close of the year 17,415, compared with 4,317 not fitted. The number fitted for gas was 376, and for electricity, 948.

# Maintenance of Way Section.

WE desire again to call attention to the contest on tools used in maintenance of way work, which will close on August 25, and to emphasize the valuable results which are possible by an exchange of successful ideas along this important line. It is not necessary to dwell on the value of good tools or tools designed for the work being done. Large numbers of new tools have been made for special purposes and modifications of old ones are even more numerous. These variations from tools in common use may be comparatively unimportant in themselves, and yet they may be of great total value in the handling of work. It is not necessary that the device be new on the division where it is now used for it to be considered in this contest, provided it is not generally known and in wide use. Neither is it necessary that the contribution be sent in by the originator of the idea, although where possible proper credit should be given. The limits of this contest will include tools used in the track, bridge, water service and any other branches of the maintenance department. We solicit the interest of our readers in this contest, as we believe it is capable of as valuable results as any recently conducted in these columns. Prizes of $25 and $15 will be awarded for the first and second best contributions, while others accepted and published will be paid for at our space rates. All contributions for the contest on tools used in maintenance of way work should be sent to the Civil Engineering Editor of the *Railway Age Gazette,* 417 South Dearborn street, Chicago, not later than August 25 to be considered by the judges of the contest.

THE truth of the common statement that the best is the cheapest is somewhat called in question by the discussion of "The Cost of a Treated Tie," published in this issue. There is very little doubt that in general the cost of treating ties is a good investment, but in this day of rapid development of the timber-treating industry the note of caution which Mr. Burkhalter sounds may not be amiss. He does not present arguments against treating ties, but against treating them unwisely. His table showing the cost of operating a treating plant and his discussions of the figures in this table bring out the point that for some species of wood treated in certain ways, not only is the cost of the treatment lost, but the tie may be actually injured by such treatment. The opponents of sorting argue that it is impracticable to separate all woods into small groups which are adapted for the same treatment, and this practical aspect of the operation of a treating plant certainly must be given careful consideration. But if sorting is impracticable it would seem wiser to refuse to take for treatment such ties as are now being treated at a loss by a process adapted to the majority and which is, therefore, used for all. The determination of the kinds of ties which are being treated at a loss involves some study, for, as the article says, "It may be felt that some ties are not doing very well in the track, but there is scarcely ever a doubt as to their superiority over untreated ties." A study which would analyze the operation of any given treating plant, as Mr. Burkhalter has done for an imaginary case, would, no doubt, result in saving the railway company money in its tie bill.

THE discussions of the Italian track laborer appearing on another page are of especial interest to those in charge of track work in the eastern states, where the larger number of track laborers is of this nationality. As shown by Mr. Lindsay in his table, the indications are that this proportion will increase in the states east of the Mississippi river. West of the river the Mexicans have recently come in in such numbers as to compete strongly with the Italian. The average Italian is not a satisfactory laborer, as is plainly brought out in these discussions. He is naturally quarrelsome, ignorant of the work and of the English language, of small stature, and has long been victimized by the padrones and interpreters. However, there are many exceptions to this general statement, and where railways can offer steady employment throughout the year they are usually able to get together a fairly efficient class of Italians who gradually become experienced in track work. Occasionally a foreman can be selected from among them, and some unusually good men have been secured thus. As the railways must depend to a large extent on the Italians for track laborers for many years to come, it is very necessary that serious attention be given to a study of the methods best adapted to secure good results from them. Undoubtedly, a part of the present inefficiency of the Italian is a result of the treatment he has received at the hands of the native foreman. Most foremen have neither the desire nor the patience to spend any more time than is absolutely necessary in teaching them their work, and a spirit of antagonism rather than of co-operation is created. If the supervisors and foremen will give this subject the attention it deserves a considerable improvement may be made in this class of labor.

THE relation that the payment of claims for stock killed on the tracks bears to the operating expenses of a railway can best be realized by citing the actual payments made on this account by two roads. A recent bulletin issued by the general manager stated that the claims paid by the Chicago Great Western last year amounted to $18,028.84, or an average of $49 per day. This is equivalent to an annual charge of $12 per mile of line. In a recent issue of the *Santa Fe Employees' Magazine,* it was stated that the payments on this account on the Santa Fe for the fiscal year ended June 30, 1910, were $150,734.06, or an average of nearly $15 per mile. Figured on a 6 per cent. basis, this would require annual interest on a fund of $2,512,234. These figures include only the actual claims paid. To these should be added the cost of burying the stock, the expenses of the claim department, etc. Many of these accidents occur at highway or farm grade crossings, and can be prevented only by separating the grades. However, a large proportion of the claims is directly traceable to lack of care on the part of locomotive engineers and track employees. The proper maintenance of fences, gates and cattle guards is an important part of the duties of section foremen, although frequently not so regarded by the roadmaster and foreman. The track foreman often considers work done by him off the immediate track as largely wasted, not appreciating the importance that the proper care of the fences bears to railway operation. In making the regular patrol of the track the condition of the fences, as well as of the track should be observed by the track walker, and any defects reported promptly to the foreman in charge. The section foreman can also render much assistance in reducing stock claims by cultivating a friendly spirit among the farmers living adjacent to the track and securing their co-operation in maintaining fences and keeping stock off the right of way. The attitude of the farmer toward the railway often depends largely on his relations with the section foreman, who is the representative of the railway with whom he most frequently comes in contact. A little time spent in calling the attention of the farmer to the ways in which he can frequently co-operate in protecting his stock, and then in seeing that the railway company's fences are kept in good condition, will be well worth all it costs and the roadmaster can afford to impress this act upon his subordinates.

## COMMITTEE WORK.

THE extent to which committee work can be carried to advantage in associations, such as the Roadmasters' and Maintenance of Way Association and the American Railway, Bridge and Building Association is a matter of considerable importance to the association. Successful committee work is at best difficult to secure, and many times the results are unsatisfactory. Although each committee is composed of several men, the members usually are widely separated in different parts of the country, so that it is impossible for them to get together to discuss their subject, and the report is usually prepared by the chairman with little or no help from the other members. This results in throwing a large amount of work on the chairman, and the value of the report depends on his energy and ability. It has been the experience of these associations that when eight or ten committees are appointed one or two of the committees usually fail to take any interest in their work and do not make any reports, so that it becomes necessary for other members of the association to prepare them in addition to doing their own work in order that any reports may be presented. Also, the number of subjects is limited, which can be taken up by various committees in one year without duplicating work already done or encroaching upon the work of other associations.

To overcome these disadvantages it has been suggested that the number of committees be reduced and the remaining committees strengthened in personnel and given better subjects. Addresses by speakers of prominence and recognized authority might be used to fill the gaps left by the elimination of some of the reports. Several mechanical associations have had experience similar to that of the maintenance associations, and have adopted this plan with much success. The Roadmasters' Association is moving in this direction this year. The number of committee reports has been reduced to five, and they are completed and in print a month in advance of the convention, a thing which has been impossible in previous years with the larger number of reports. At least one prominent speaker has been secured to address the next convention upon a subject closely related to the work of the association.

The method of selecting subjects for committee work has also been discussed recently to a considerable extent, and the suggestion has been made that a standing committee be appointed to select topics to be considered during the subsequent year. In the Bridge and Building Association it has been the practice to appoint a committee one day to report the following day on the subjects for the next year. This gives too limited a time to make up the list of subjects. In the case of the Roadmasters' Association the executive committee meets some time after the convention to assign subjects. This plan is open to the objection that the committee cannot organize immediately following the convention when the interest in the association's work is at its height. When a committee is appointed one year to report the following year, ample time is given for careful study of the subject assigned, and a careful report can be made at the convention.

It has been suggested that a committee composed of members from each of the associations in the maintenance of way field could work to advantage by suggesting subjects to be considered by the different associations so as to prevent the overlapping of work that now sometimes occurs. The objects of the different associations are common, in that they are endeavoring to disseminate information concerning the various branches of the maintenance of way work. There is such a wide field to be covered that any duplication means a loss of efficiency and other work must be left undone. The same problem is being met in the mechanical associations, and there is some little talk of starting a similar movement in that field.

## DEVELOPING FOREMEN.

THE ability to develop capable foremen ranks hardly second in importance among the qualifications of a successful supervisor to a thorough knowledge of his work. In past years when the supply of foremen equalled or exceeded the demand, the necessity for training men to fill vacancies was not as great as it is in the present period of transition from native to foreign foremen. The supervisor who can detect the one man in a group who has the latent talent necessary to enable him to assume the duties of a foreman, and who is patient and willing enough to train him for his duties, is the one who surrounds himself with a capable group of subordinates.

If the supervisor will only consider for a moment he will see that time spent in proper attention and instruction now will lessen his troubles and responsibilities materially in a few years, for with a reliable body of foremen he can safely leave attention to many details of track maintenance to them. While the proportion of native foremen varies largely in different sections of the country, the proportion of them under supervisors in adjacent territories is as a rule an indication of the relative abilities of the supervisors to develop foremen. Men will remain with a supervisor who is a good organizer, and, in addition, they will gather about one who interests himself in them and builds up his work through them. Almost every supervisor has a few men in his ranks who are capable of becoming foremen if properly developed. Such men as these may require patient instruction, but the results that are obtained in most cases are well worth the time and effort required.

The personal interest shown by the supervisor in the progress and welfare of his employees will enlist their best efforts as in the case of any other class of men. A supervisor of an eastern road learned recently that one of his foremen was drinking heavily. Instead of going directly to him and reprimanding him, he went to another foreman who was an intimate friend of this man and suggested that he go to see him on the following Sunday and have a talk with him. The result was that the man was persuaded to stop drinking, the supervisor retained an efficient foreman and the second foreman was strongly impressed with the interest the supervisor took in his men. Again, a supervisor who won a large prize for improvement in the maintenance of his track divided a portion of this prize among the foremen directly, and, in addition, arranged a banquet for them at which the methods of handling the work during the previous season were discussed. The result was that he now has a group of foremen who are willing to do almost anything he asks, and who give him their united support. Another supervisor arranged a picnic one Sunday which all his foremen and their families attended. Such methods build up the sort of loyalty which is ordinarily conspicuous in the railway business today by its absence, and the best maintained track is likely to be found where it exists. It is an uphill fight at best under present conditions for a supervisor to build up an organization, and it is, therefore, well worth his while to pay some attention to developing his workmen. Attention given to seeing that the company maintains the section house in a habitable and comfortable condition, that transportation is furnished the foreman and his family for occasional trips, that material and tools are supplied the gangs promptly, and that the foreman is given the support of the supervisor wherever possible, all have their effect on the men.

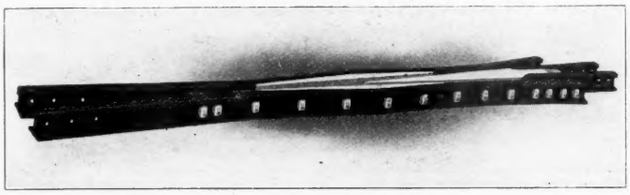
That "the best workman is a satisfied workman" is true now as it always has been, and many supervisors who are loud in their complaints about the class of labor which they have to choose from might profitably pause and consider whether they are getting the best possible results out of the labor which they have.

# THE USE OF MANGANESE IN TRACK WORK.

**A Discussion of the Economies Resulting from Its Use with Reports of Actual Results Secured on Many Roads.**

MANGANESE IN TRACK WORK.

As traffic, the weight of motive power and equipment and the speed of trains have increased, the wear upon that portion of the track structure which comes in contact with the moving trains has also greatly increased. This wear is especially evident on the outer rails on curves and at switches, frogs and crossings where the continuity of the rails is broken and the hammering action of the equipment is most severe. This action is so destructive that the high rail on curves frequently has to be renewed within a few months, and frogs last but a few weeks. Not only has the wear increased, but with the increase in traffic more multiple main tracks and larger yards have been required, multiplying the number of switches and frogs subject to this heavy traffic. The labor cost of renewal and the delays to traffic incident to replacing worn rails or frogs are



**Pennsylvania Steel Company's Standard Type of Insert Frog.**

greatest on heavy traffic main lines, and these items enter largely into the cost of maintenance. Such conditions have brought about a demand for a material for use in these places of heavy traffic which would give a greater resistance to wear and a life more nearly equal to that of the adjacent track structure. To meet this demand several alloy metals have been tried, especially in rail, with varying degrees of success, but manganese is now the only one used to any extent in these places of very heavy wear.

The development in the manufacture and use of manganese in track work has been very rapid. The first manganese frogs were made about 15 years ago, and consisted of castings inserted along the wearing faces of the frog. Until within the last few vears all manganese used was in the form of castings. The development in the manufacture of this material has now

**Solid Manganese Frog; Indianapolis Frog and Switch Company's Design.**

proceeded so far that the metal can be rolled, and a considerable quantity of manganese has been rolled into standard rail sections.

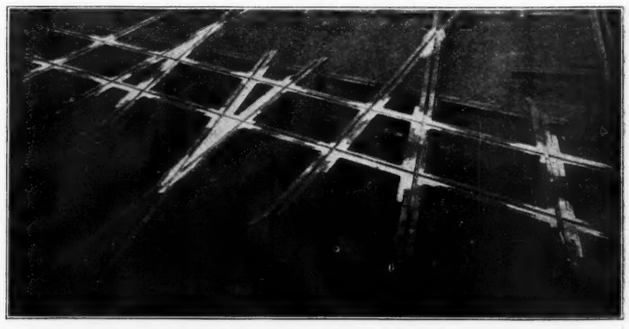
When the frogs and crossings were first made of this material much difficulty was experienced with the castings cracking, especially where there was a change in the size of sections. Careful study of this type of failure led to the conclusion that these cracks first developed as a result of the initial strains set up in the metal during the cooling of the casting and then opened up later under traffic. Some of the early frogs and crossings put in experimentally failed in this manner and created a prejudice which has been hard to overcome. This difficulty has been very largely eliminated in recent years by careful designing of the castings to maintain uniformity of sections and by further development in the process of manufacture.

MANGANESE FROGS.

Manganese frogs are in use in large numbers and are of two general types, the solid cast manganese frog and the insert or hard center frog. The insert frog is used in largest numbers on main lines, while the solid frogs are used very largely in terminals and heavy freight yards. The first manganese frogs were all of the hard center type and the solid frog has come into general use only with the past few years.

A frog first wears down on the wing rails opposite the point where the wheels, and especially the tread-worn ones, first strike the wing rail after passing across the interval in front of the point. As the wing rails are cut down the point is exposed to blows from the wheels and is soon broken or worn down. Early attempts to remedy this condition were directed toward placing hard steel pieces in recesses opposite the points formed by bending the wing rails outward. Later manganese castings were inserted in the wing rails, and this practice was soon followed by the use of a larger casting, including both wing rail protectors and the frog point, with another manganese casting for a riser block or incline back of the frog. In the more recent designs for the ordinary length of frogs the wing rail casting extends back to include the riser block.

As the process of manufacture of the manganese castings has



**Pennsylvania Steel Company's Type of Insert Crossing.**

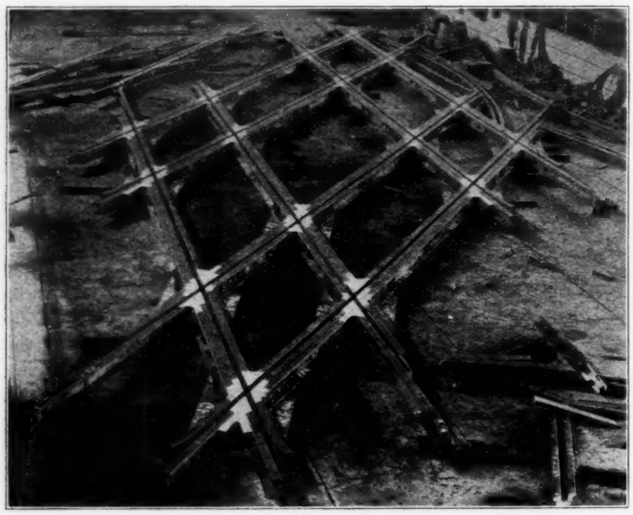
developed the tendency has been to use larger castings in the insert type of frog, and this has led to the solid cast manganese frog. With the development in the methods of treatment of manganese the danger of breakage has largely been eliminated, while with the decrease in the cost the difference between the cost of the insert and solid types has decreased. In some designs the frogs are now built up with rolled manganese rail and a cast manganese point bolted together in the usual manner.

The solid manganese frogs differ in their manner of connecting to the main rails, the nature of the connection depending on the individual designs of the different manufacturers. Some extend the manganese casting back a sufficient distance to allow room for the joint fastenings and provide an offset in the wings of the castings into which the rails fit directly and are bolted in place. In other types of solid frogs small sections of rail with the ends cut and curved to fit the castings are bolted in and the main rails are fastened to these short sections of rail. Likewise, with the hard center or insert frogs the details vary with the individual manufacturer. Some firms bend the wing rail out without removing any part of the head or base to insert the castings; others remove a portion of the surrounding wing rail to provide a place for the casting.

While the hard center and solid frogs each have their advocates each type possesses certain advantages over the other. Because of the greater amount of manganese used the solid frog is somewhat more expensive than the insert type, although the

difference has decreased as the processes of manufacture have developed, until now the ratio of cost of a solid frog to a rail frog is about three to one and of an insert type frog about 2½ to one, varying, of course, somewhat with the angle and design of the frog. The danger of solid frogs cracking has prejudiced some men against their use because when they crack there is no surrounding metal to hold them in place. On the other hand, if the manganese insert in the hard center type should crack it is held in place by the surrounding rail, and there is little opportunity for the crack to prove dangerous. One disadvantage with the older design of insert frogs was the tendency in some cases for the rail to wear away from the manganese at the point of contact. This, however, has been very largely eliminated in the designs now in use. With the solid frog the rail butting against it can be turned end for end or replaced without disturbing the frog. These are, however, comparative advantages between the two types of frogs, and do not relate to their economy as compared with the rail frog.

The relative economy of manganese frogs as compared with the ordinary frog depends on the life of the ordinary frog. A manganese frog is not economical under all conditions, and the life of the ordinary frog must be considered. As an approximate rule some roads consider manganese economical where the life of the ordinary frog is less than 1½ to two years, although this ratio again depends upon the life of the rail in that vicinity. There is little economy in the use of a frog which will outlive the rail, as frogs are usually removed whenever the rail is relaid. Rather, the tendency should be to provide a track structure which will approximate the same life. On the other hand, the shorter the life of the ordinary frog the greater is the economy of the manganese frog, for aside from the saving in material, the labor cost of maintenance and renewal and the delay to traffic when making changes are consequently more expensive. There are a great many places today where manganese can be used with economy and the field for its use is extending



**Insert Type of Crossing Made by the Indianapolis Frog and Switch Company.**

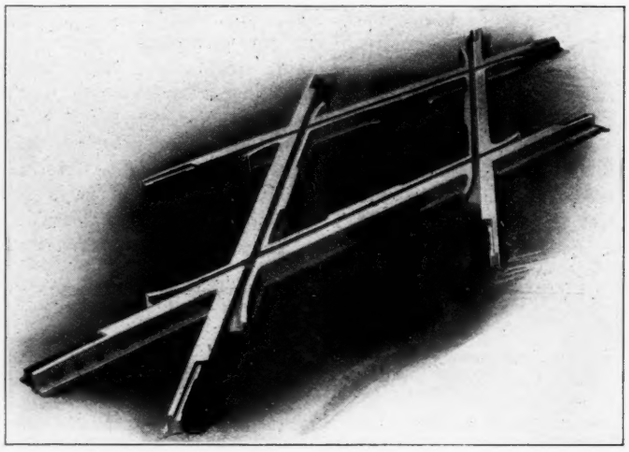
rapidly as the traffic increases with the resulting increased wear upon the track structure.

In considering manganese, the nature of the traffic passing over the frog should be considered. For instance, at a point where the traffic over one track is much heavier than on the other, as on a side track seldom used leading out from a busy main track, it may be necessary to build the frog of manganese on the heavy traffic side only; in some cases manganese is used only in the wing rails, it being claimed that as long as the wing rails stand up there is no opportunity for the point of the frog to be battered.

The accompanying photographs illustrate types of frogs, crossings and switchpoints of approved designs. While showing in some details the particular designs of the manufacturers, they are selected because they are representative of good practice and not because there are not other makes equally as good, as designs similar to these are made by a number of prominent manufacturers.

SERVICE RESULTS WITH MANGANESE FROGS.

Reports received from about 25 roads which have used manganese most extensively indicate that much economy has resulted from its use. The following results are taken from information furnished by these roads:



**Wharton Type of Solid Manganese Crossing.**

The Norfolk & Western has now over 200 manganese hard center frogs in track. Statistics covering 38 rail frogs show that they lasted an average of 10 months and 18 days; 26 manganese insert frogs under similar conditions lasted an average of 3 years, 1 month and 10 days. One No. 15 frog at the end of double track lasted two years and eight months, and about 50,000,000 tons passed over it.

Manganese frogs have been used almost exclusively within the limits of all yards and at the ends of double track on the Chesapeake & Ohio for about six years. They are largely of the insert type, although some solid frogs are also used. They are in service under heavy coal traffic with 50-ton cars. Their life is found to be from six to eight times that of the ordinary rail frog under equally hard service.

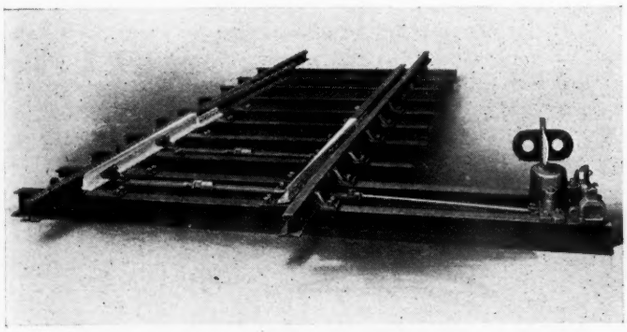
The Terminal Railroad Association of St. Louis has about 60 manganese frogs, mainly solid, of 100 lb. A. S. C. E. section, in its tracks, the first one laid being a No. 7 frog placed in the track on July 6, 1907. They are all in tracks carrying heavy traffic, and none have been removed on account of wear, although quite a number of solid frogs have been removed because of breakage.

The Chicago & Western Indiana placed a hard center manganese crossing frog in track with three other frogs of common rail in May, 1908. The three rail frogs were removed in January, 1909, while the built up manganese frog was still in service when a report was made last fall. At another point on the same road where the traffic is extremely heavy an insert manganese frog was placed in the track in April, 1909, and while considerably worn when the report was made it was expected to last for several months, although, previously, ordinary frogs wore out within an average of six months.

The Santa Fe installed two No. 9 85-lb. frogs built up of rolled manganese rail at the north end of the Corwith yard, Chicago, on April 19, 1909, where the traffic was very heavy. These frogs are still in service and in first class condition, although it is estimated that at least five ordinary frogs would have been worn out during the time they have been in service. Two manganese insert frogs were placed in the tracks of the

Santa Fe at Camden Junction and Carrollton Junction, Mo., where the traffic of both the Wabash and the Santa Fe is handled. These frogs have been in service four years and it is estimated that they are good for two or three years additional service, although they have now out-worn four or five ordinary frogs.

On one division of the New York, New Haven & Hartford hard center frogs were placed in a main line track in December, 1908. They are still in track, and it is estimated that they are good for two years' further service. Ordinary stiff rail frogs in this location had to be replaced every three to six months. Other manganese frogs on the New Haven have given similar results.



**Lorain Steel Company's Manganese Tipped Switch Point.**

The Pennsylvania Lines west of Pittsburgh, Northwest system, have kept very careful records of manganese and ordinary frogs. The accompanying table gives a comparison of the life of manganese or special frogs and of ordinary frogs. To insure a correct comparison, a special frog was in all cases installed in place of a worn out ordinary frog, of which the first cost and life were known. This gave the special frog a trial under the same conditions as the ordinary frog, except so far as traffic varied from year to year. In many cases the life of the special frogs has been estimated, as at the date of last report they were still in service. The interest on the first cost has not been included in the accompanying table.

Comparison of Lives of Special and Ordinary Frogs on Pennsylvania Lines—Northwest System.

| | Number of Frogs Compared. (Special and Ordinary.) | Average Life In Months. | | Average Cost Per Month. | |
|---|---|---|---|---|---|
| | | Special. | Ordinary. | Special. | Ordinary. |
| | 37 each | 50 | 14 | $7.20 | $14.61 |
| | 12 each | 53 | 15 | 8.64 | 18.39 |
| | 15 each | 67 | 13 | 2.18 | 4.02 |
| | 17 each | 39 | 9 | 6.57 | 8.20 |
| | 42 each | 48 | 14 | 10.16 | 21.68 |
| | 3 each | 36 | 12 | 5.70 | 9.30 |
| Totals and averages... | 126 | 50 | 13 | $7.60 | $15.07 |
| | 33 each | 48 | 14 | $4.13 | $6.98 |
| | 29 each | 58 | 15 | 4.88 | 7.18 |
| | 80 each | 40 | 13 | 3.14 | 4.45 |
| | 19 each | 48 | 12 | 5.94 | 9.14 |
| | 46 each | 57 | 15 | 5.68 | 9.68 |
| Totals and averages... | 207 | 48 | 13 | $4.36 | $6.83 |
| | 28 each | 38 | 9 | $5.45 | $15.33 |
| | 9 each | 51 | 18 | 2.69 | 2.91 |
| | 19 each | 34 | 13 | 3.40 | 6.33 |
| | 13 each | 66 | 14 | 5.01 | 5.18 |
| Totals and averages... | 69 | 44 | 14 | $4.48 | $9.32 |

Hard center frogs are used throughout the main line and important branches of the Central of New Jersey, several hundred being in service. The manganese frogs outlast from eight to ten ordinary rigid frogs, and experience here indicates that they will outlast at least two or three spring rail frogs.

The Lake Shore & Michigan Southern has been using hard manganese frogs for a number of years on its standard No. 16 turnouts, of which there are a large number. This road also has one of the old original anvil face type frogs which has been in service for 12 years at Air Line Junction, Ohio, and is still in serviceable condition. It is also using manganese frogs of larger angles, especially No. 8, in yards, and the results indicate that these frogs are lasting about four times as long as the ordinary frogs.

The Pennsylvania Railroad uses manganese frogs almost exclusively in main lines, and finds that they last from ten to twenty times as long as a stiff frog of ordinary Bessemer steel.

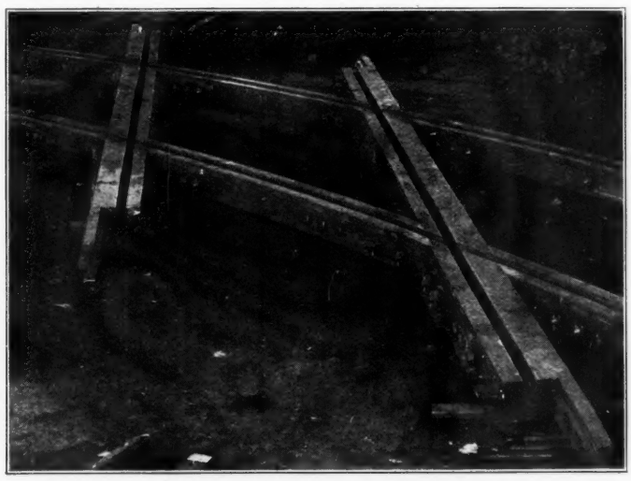
The Chicago, Rock Island & Pacific has kept careful records of the lives of several manganese frogs which are in service in busy tracks. The results are shown in the accompanying table.

Lives of Manganese and Ordinary Frogs on the Rock Island.

| Type of manganese frog... | Cast center | Solid cast | Solid cast | Solid cast |
|---|---|---|---|---|
| Test number ..... | 1 | 2 | 3 | 4 |
| Present service of test frog. | 56 months | 29 months | 28 months | 25 months |
| Average life of standard frog | 4 months | 4 months | 5 months | 4 months |
| Number renewals saved.... | 14 | 7.25 | 5.6 | 6.25 |
| Estimated cost of renewals and maintenance of standard frogs for same service | $401.10 | $207.71 | $161.84 | $179.06 |
| Cost of test frog installed and maintained to date.. | 140.66 | 102.70 | 101.30 | 122.50 |
| Net saving to date..... | $260.44 | $105.01 | $60.54 | $56.56 |

As to the present condition of the test frogs in service on the Rock Island, the point of No. 1 shows considerable wear, but appearances indicate that it still has the life of two standard frogs. Nos. 2, 3 and 4 are in excellent condition. These frogs are all located in busy tracks. The estimated cost of renewals and maintenance is based on the cost of standard frogs less the average scrap value. The labor of changing out frogs and the average cost of maintaining adjacent frogs subjected to the same service are also considered.

Three manganese frogs placed in the track of the Chicago & North Western at the old Wells street station, Chicago, three years ago, are still giving good service, although the life of the old frogs was only three months. Two of these manganese frogs show about ⅛ in. wear, and the other about ⅜ in.



**Crossing Built of Manganese on Important Track and of Common Rail on Unimportant Track; Indianapolis Frog and Switch Company's Design.**

Material progress has been made recently in the repair of manganese frogs and crossings by which the life can in many cases be materially increased. It sometimes happens that a small piece will chip out and the frog be good otherwise. If left in that condition the chip will grow until it will become necessary to remove the frog. The Central of New Jersey and the Reading have recently begun the practice of grinding down frogs damaged in this way so that a new smooth surface is provided, in which case the frog will last as long as if it had not been chipped. Likewise, frogs worn in service are ground down in the same way and returned to the track, where otherwise they would require replacement.

MANGANESE CROSSINGS.

The development in the use of manganese crossings has been largely similar to that of the frogs. They also have been made in two types, the insert and solid, and are put out in one, two or four pieces, according to weight and angle, as with ordinary crossings. A third type of manganese crossing has been made within the past two years, with manganese rail inserted in place of the ordinary rail on those sections subject to heavy wear. By building up a crossing with manganese rail used only where it is needed a wide variety of designs is possible, suited to the local conditions, and very economical results are possible. In all these designs frequently where a street railway or an important branch line crosses a heavy traffic main line, only the main line sections are made of manganese and the others of ordinary rail. The details of the two types of crossings shown illustrate generally the construction of the ordinary manganese crossing.

The Norfolk & Western has about 50 grade crossings, each with from one to eight sets of manganese crossing frogs. These frogs have been found to have a life of from two to four times as long as the rail frogs. One crossing was in track two years with about 35,000,000 tons passing over it.

MANGANESE SWITCH POINTS.

The use of manganese switch points is a development of the last few years, but they are coming into use rapidly where the life of the ordinary point is short. There are three types in service. In one the switch point is cut off horizontally at the base of the head for the length of the manganese point and the manganese rests on the web and also extends down along the web to the base of the rail, being bolted to the web. In another design the switch rail is cut off vertically some distance back of the point and the entire point is made of a manganese casting which is fastened to the main switch rail either by manganese straps extending along the main rail or by straps extending forward from the Bessemer rail, the two being solidly bolted together. The third type is an entire switch point made of manganese. Each type has its special advantages and good results are secured in service from each.

As an example of the savings possible by the use of manganese switch points where the wear is severe, the Pennsylvania installed one, an 18-ft. switch point, at a place where an ordinary point lasted only one week. The manganese point lasted 31 weeks before requiring renewal, and cost $30 as compared with $18.75 for the 18-ft. ordinary point. At another place a 30-ft. manganese point lasted nine months and five days where the maximum life of the ordinary point was one month. In this case the expense of the 30-ft. manganese point was $45 as compared with $28.30 for the common point.

Manganese switch points are being used extensively and with excellent results in the new tracks laid in the Grand Central Terminal, New York, in the Central of New Jersey terminals at Jersey City, and at a number of other important terminals.

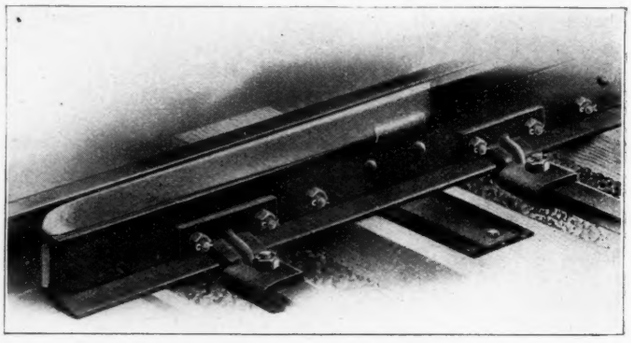
ROLLED MANGANESE RAIL.

The use of manganese for rail has received considerable impetus during the past two or three years since it has become possible to roll this material into rail. Previous to this time, however, a number of pieces of track were laid experimentally with cast manganese rail. The use of manganese in rail gives the same greatly increased wear that is found in crossings, although in some cases difficulty has been experienced in keeping this in line and surface, as it does not seem to have the desirable amount of stiffness and seems to yield to unequal bearings more than does Bessemer rail.

About 1,362 lineal ft. of 85-lb. rail were laid April 19, 1909, on the high side of a curve at Thompson, Pa., on a division of the Erie now maintained by the Delaware & Hudson. At the same time 90-lb. Bessemer and open hearth rail was installed at the same location for comparison. Both of these latter kinds of rail were renewed on June 1, 1911, because of their worn condition, while the manganese rail, with the exception of one rail which cracked, is still in the track and shows but very little sign of wear.

The Santa Fe laid 924 ft. of 85-lb. rail on November 26, 1909, on a 10-deg. curve at the west end of the Mississippi river bridge. On inspection of this on November 25, 1911, after two years' service, it was found that the low rail had worn off at the top about one-tenth of an inch, while the high rail had worn off about one-twentieth of an inch and had worn back on the inside corner about one-fifth of an inch. This rail will give at least two years' additional service, whereas it was necessary to change out the standard rail on this curve at least once a year.

The Lake Shore & Michigan Southern has some 85-lb. manganese rail in a track at Buffalo which was laid in April, 1910. Late in the summer of 1911 this was reported good for several months further service, although Bessemer rail had been lasting only about six months at this point.



**Ramapo Manganese Tipped Switch Point.**

The Chicago, Milwaukee & St. Paul has about 50 tons of manganese rail on an 8-deg. curve at the east end of the Satula bridge across the Mississippi under very heavy traffic where Bessemer rail ordinarily wore out in 1½ years. This manganese rail had been in track about 18 months at the time a report was made regarding it.

The Metropolitan West Side Elevated Railway, Chicago, has in track about 175 tons of rolled manganese rail which is laid on curves varying in radius from 90 to 1,000 ft. The first of this rail was placed on a curve of 250-ft. radius about two years ago, while a large portion of it has been in track for one year. The traffic over these curves is very heavy and the wear on the head of the rail is excessive, because of the grinding action of the motors. In many cases 1,600 trains pass over the curves per day. In March of this year measurements taken with a rail-measuring machine to determine the approximate relative wear of manganese and high carbon open hearth and Bessemer rail showed that under the same conditions manganese rail was outwearing the high carbon open hearth rail about four or five to one and the Bessemer rail eleven to one. In addition to rolled manganese rail, cast manganese rail is used on the curves of the Union Loop in Chicago, which are of 90 to 120-ft. radius. This rail has been in service from three to four years, and from the standpoint of resistance to wear is giving satisfactory results, although it has been found that the cast manganese frequently breaks and has to be removed.

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Chilean Longitudinal Railway.—Rails have met through the Espino tunnel from the Andean section of the longitudinal railway in Chile. This tunnel was the key to this railway undertaking, and the last big tunnel of five to be holed through. The railway has 43 miles of the Abt system running along the spurs of the Andes. It will open up rich copper and other mineral deposits, also agricultural valleys. Great difficulties have been overcome in the carrying out of this work, and the contractors are ahead of contract time.

## YARDAGE SLIPS FOR SCALING EARTHWORK QUANTITIES.

The advantage of being able to scale reasonably accurate earthwork quantities directly from a profile is generally recognized, and scales have frequently been prepared for this purpose. A narrow strip of profile paper can be used on which is plotted to the same scale as the vertical scale on the profile the yardage values obtained from an ordinary table of level cuttings. When it is considered, however, that a section having a 20 ft. base, 20 ft. fill on center line, 1½:1 side slopes and 3:1 ground slope, has an area of 35 per cent. greater than a level section of the same base, height and side slopes, it is evident that results obtained from such a scale are not as accurate as could be desired. An improved method of preparing yardage slips to take account of the ground slope has been worked out by C. A. James, assistant engineer of the Lehigh Valley at White Haven, Pa., and has been published in booklet form, including a full set of diagrams for plotting slips showing yardage per station for any probable roadbed width, any center cut or fill, any ground slope and for side slopes of ¾:1, ½:1, 1:1, and 1½:1. The originator of this system says in the preface to the booklet that a draftsman can make a complete set of slips for any standard roadbed width in one day, and that if the plotting is correctly done the quantities read from such slips will be correct within 3 per cent.

The booklet gives the derivation of a formula for the area of a sloping section which does not involve trigonometrical functions and which applies to all sections in which the ground slope does not intersect the roadbed. This equation consists of two terms, the first of which represents the total area of a triangle included between the ground slope and the side slopes extended above or below the roadbed to their intersection, and the second the area of the triangle above or below the roadbed. The difference between these areas is that of the quadrilateral in the section to be moved. From the theory used in deriving this equation a relation is established between the center heights of a sloping section and of a level section of equal area. A diagram is plotted for each desired value of side slope, which has a vertical base line along which are plotted the height of a level section and the corresponding yardage per station, and which has lines radiating from the zero point of this scale corresponding to various ground slopes and angularly located by the relation of section heights mentioned above. These radial lines are graduated to the same scale of height as the vertical line by means of circular arcs drawn about the zero point of the vertical scale as a center. Horizontal lines are drawn from the vertical scale to facilitate the reduction of a sloping section height to its equivalent level section height. With each of these diagrams a fixed scale is used for reading the second term of the area formula, it being necessary to perform a subtraction in each reading of the diagram. From a set of such diagrams prepared for various side slopes it is possible to determine the yardage per station for any width of roadbed, height of section, ground slope and side slope, and conversely the height of section for a given yardage, side slope, ground slope and roadbed width, provided the ground slope does not intersect the roadbed. For sections in which this is the case a special series of diagrams is prepared in which are plotted the relations of yardage, side slope, ground slope and depth of cut or fill measured at one extreme edge of the roadbed.

To make a quantity slip for any given roadbed and slopes a point is first taken as representing grade, and a point is then located a distance below this grade equal to the center height of a section in which the ground slope meets the roadbed at one extreme side. From this point up to a point the same distance above grade the heights of sections corresponding to yardages of even hundreds are laid off. To plot the heights of sections in which the ground line does not intersect the roadbed a point is first located a distance below grade equal to the height of the triangle included between the roadbed and the extensions of the side slopes to their intersection. From this point heights obtained from the diagrams previously plotted, corresponding to even yardages are laid off. This method of plotting makes a scale which is readily and accurately read. To read the scale, the zero point is placed on the grade line in a cut or the ground line in a fill and the yardage per station is read directly opposite the ground or grade line as the case may be.

## ABSTRACT OF ENGINEERING ARTICLES SINCE JULY 19.

The following articles of special interest to engineers and maintenance of way men, and to which readers of this section may wish to refer have appeared in the regular weekly issues of the *Railway Age Gazette* since July 19:

Yard and Shop Improvements at Boone, Iowa.—A large and modern division terminal has recently been completed at Boone, Iowa, for the Chicago & North Western. H. Rettinghouse, division superintendent, described very fully the yard layout and shops in this terminal in an illustrated article in the issue of July 26, page 151.

Report of Annual Inspection of Experimental Track on the Gulf, Colorado & Santa Fe.—One of the most important experiments that are being conducted to determine the comparative value of different types of tie treatment is that on the Beaumont division of the Gulf, Colorado & Santa Fe. An annual inspection of this track is made, and the report shows all ties removed up to date, with the condition of those still remaining in track. An abstract of the ninth inspection was published in the issue of July 26, page 159.

Duluth, Missabe & Northern Improvements at Hibbing, Minn.—The very dense traffic handled by the D. M. & N. between ore mines on the Missabe range and the docks at Duluth necessitate very complete yard facilities. One of the latest yards installed is that serving the group of pits at Hibbing, Minn. This yard is described in the issue of July 26, page 166.

The Broken Great Northern Rail.—James E. Howard, engineering physicist of the United States Bureau of Standards, made a very complete report on the broken rail which caused the wreck of the Great Northern passenger train near Sharon, N. D., December 30, 1911. His conclusions were discussed in an editorial in the issue of August 2, page 188.

Construction of the Galveston Causeway.—The building of the new causeway to connect the island of Galveston with the mainland, which will prevent tidal waves and storms from breaking the connection with the mainland, has been watched with a great deal of interest by engineers and the public generally. The structure is an unusually permanent one, of flat concrete arches with a protected roadway at each end and a rolling lift bridge in the middle to allow the passage of boats. The interesting features of the construction of this causeway were described in an illustrated article in the issue of August 2, page 194.

Capacity of Upper Lake Ore Docks.—A table of capacities and general dimensions of all ore docks on the upper lakes was published in the issue of August 2, page 203.

New Rail Sections.—There is a growing tendency among rail experts to favor a modified section, and in line with this tendency it is interesting to note the new section designed by E. C. Carter, chief engineer of the Chicago & North Western, and which is now being used on that line, and another section which is being rolled for the Rutland Railroad, which was designed by Dr. P. H. Dudley of the New York Central Lines. A description of these sections appeared on page 208 of the issue of August 2.

Ventilation of the Pennsylvania Tunnels at New York City.—The location of ventilating fans and the apparatus installed for operating them were described in an illustrated article on page 212 of the issue of August 2.

Illinois Central's New Centralia Yards.—The Illinois Central is now completing a large classification yard at Centralia, Ill., in the design of which considerable care was taken to secure the most efficient layout and the best profile over the hump. Shelby S. Roberts, division engineer of construction, who was in charge of the building of this yard, described the interesting features of design and construction in the issue of August 9, page 236.

Valuation of Railways in New Jersey.—The methods used and the results obtained in a recent valuation of the railways in New Jersey were shown in an article in the issue of August 9, page 243.

West Shore Weehawken Tunnel Ventilation.—A new installation of the Churchill system of ventilation on the West Shore was fully described in an illustrated article in the issue of August 9, page 252.

ORURO TO COCHAMBA RAILWAY, BOLIVIA.—Grading on this line has been completed on the first section of the line from Conacona to Aguascalientes, and trains will soon be running to the latter place. At Ventanilla canyon active work is being carried on, all construction work being of a solid and substantial character.

## THE HABIT OF THINKING.

BY C. CLAY,
Atchison, Topeka & Santa Fe, East Las Vegas, N. M.

James J. Hill was quoted recently as saying that there are excellent prospects in the railway field for a young man who shows initiative. Presuming that this is so, are they permitted to show initiative after being employed? Are they allowed to think? In very few cases. It is a short-sighted policy to issue instructions which cover the minutest detail and leave nothing for the worker to figure on. The worker in time forgets to think, becoming less efficient, and, by not figuring on his work, wastes money for the company. A section foreman who wants all his work outlined for him before he can do anything always has poorly maintained track, for he has lost the power of thinking out the work for himself.

The trouble is largely with the officers and it exists in all departments. There is the trainmaster who insists on running the train he is riding; the master mechanic, who shows the machinist how it should be done; the general foreman of bridges, who takes charge of the gang he is visiting; and the roadmaster, who runs his district on butterflies. Such methods practically amount to a threat that a man who shows that he is capable of thought will be discharged, as no competition is allowed. Such petty jealousy ought not to exist, but it does. No officer should let petty jealousy blind him to the fact that the more the men under him think the more efficient he will be considered, as he is judged largely by the competence of the men under him.

If a machinist is not capable of thinking out how a piece of work should be done, he is not worth while. If a trainman switches cars in a manner which delays the train, his lack of thought may mean other delays before the day is over and increase the cost of operation. If a section foreman has to have the roadmaster show him every piece of work he has to do, the gang loses many hours' time waiting for the roadmaster. When a man fails to think and waits for his work to be laid out for him, he cannot be expected to show initiative in an emergency. By using the brain constantly a man is better able to meet an emergency, which in railroading is bound to arise sooner or later, for his brain will act the quicker from such use.

The man who is not allowed to think is incapable of economy in his work. If there was a cheaper and just as effective a way of doing it, it would never occur to him. The railways want competent men who will practice economy and need them badly, but when a vacancy occurs it is difficult to determine whom to promote because the logical man for the position has been repressed until he has become a mere cog. I have heard officials say: "If that man quit tomorrow, I do not know where I would find a man to take his place." Such men are not educating the men under them to think, which means that they themselves are forgetting to think. A man is often only too willing to become a cog. It is tiring for him to have to think about his work. Therefore he relies on the other fellow and sinks into a lethargy. Take, for instance, the section foreman who has unloaded material from the local train going in one direction for some time. When it is necessary for material to be unloaded from the local running in the other direction, he gets notice and pays little attention to it. He goes to the wrong end of his section to meet the train he is used to meeting, and causes a backhaul of material and consequent delay to trains.

In addition to thinking carefully about methods of doing work, men should cultivate a retentive memory. Do not keep notes unless absolutely necessary for purposes of record. Learn to refer to such notes only when necessary to verify a statement. The keeping of notes and constantly referring to them means a loss of time and the more voluminous the notes the greater the loss. The man who is thinking about his work should also learn to memorize what he learns. He should be able to continue his work while answering questions as to standard specifications of the general information concerning the work.

## ROADMASTERS' ASSOCIATION CONVENTION AT BUFFALO.

More than the usual amount of interest is being shown in the annual convention of the Roadmasters' and Maintenance of Way Association which will be held at the Hotel Statler, Buffalo, September 10-13. The present officers have been very active in promoting the interests and welfare of the association during the past year, and the prospects are good for a very profitable convention. From reports already received it is expected that the attendance will exceed that of previous conventions. The exhibit of the Track Supply Association will also be considerably increased over that of preceding years, over 50 firms having already signified their intention of being represented. Following is the program:

TUESDAY, SEPTEMBER 10.

Convention called to order, 10 a. m.
Address of welcome by Louis P. Furhman, Mayor of Buffalo.
Address of welcome on behalf of the Buffalo railways by B. M. McDonald, division engineer, New York Central & Hudson River.
Address of welcome on behalf of the railway managements of America by C. S. Mellen, president, New York, New Haven & Hartford.
Paper by Dr. P. H. Dudley, consulting engineer New York Central Lines, on "The Development in the Past Three Decades of Rail Sections, Higher Standards of Track, Heavier Equipment, Wheel and Train Loads and Faster Schedules."
Reading of committee reports and general discussion.
Moonlight excursion on Lake Erie.

WEDNESDAY, SEPTEMBER 11.

Election of officers.
Reading of committee reports and general discussion.
The Lackawanna Steel Company's plant will be visited under the guidance of Dr. Dudley and other rail experts.
Reading of committee reports and general discussion.

THURSDAY, SEPTEMBER 12.

Reading of committee reports and general discussion.
Installation of officers.
Addresses of supply men in attendance and general discussion.

EVENING SESSION.

Banquet by the Track Supply Association for members and guests of the Track Supply Association and the Roadmasters' and Maintenance of Way Association. At this banquet the following will respond to toasts: Hon. W. M. German, M.P.,K.C., Welland, Ont.; G. L. Moore, engineer maintenance of way, Lehigh Valley; G. B. Owen, engineer maintenance of way, Erie; C. H. Stein, engineer maintenance of way, Central of New Jersey; J. V. Neubert, engineer of track of New York Central & Hudson River; H. J. Pfeiffer, engineer maintenance of way, Terminal Railroad Association of St. Louis; S. W. Blaiklock, engineer maintenance of way, Grand Trunk.

On Thursday a trip will be made to Niagara Falls. The electric power plants, the Ramapo Iron Works and other places will be visited.

Committee reports will be presented on "Foreign Labor," "Stone Ballast from the Crusher to the Track," "How to Secure Foreman—Organization of Section—Length of Section," "Under What Department Should Construction Work Be Handled to Obtain Best and Most Economical Results?" and "New and Improved Appliances."

# THE ITALIAN AS A TRACK LABORER.*

**The Third of a Series of Discussions of the Characteristics of the Various Types of Maintenance Workmen.**

## THE ITALIAN AS A RAILWAY TRACKMAN.

BY C. E. LINDSAY,
Division Engineer, New York Central & Hudson River, Albany, N. Y.

Many railway officials are disposed to give the characteristics of the railway trackman little consideration, being satisfied if they can get enough of them to do the work somehow; but as the generals of England's armies were recruited on the playgrounds of Eton, so the trackman of today may be the section foreman, roadmaster or president of tomorrow or the day after, and it is incumbent on those who plan for the future to give the subject greater attention. The history of the past 25 years furnishes many interesting and valuable facts.

According to the statistics of the Interstate Commerce Commission for the fiscal year 1910 there were then over 44,000 section foremen employed in the United States with wages averaging $1.99 per day—an average of 18 foremen per 100 miles of line. There are about 375,000 trackmen with wages averaging $1.47 per day, or 156 men per 100 miles of line. Notwithstanding the large increase in miles of track per mile of line, there has not been a corresponding increase in the number of foremen or trackmen, so that eventually the number must materially increase, unless the railways are to be allowed to deteriorate, or improved methods of work and a better class of men are to be found.

In 1900 39 per cent. of the grand total of railway employees were unskilled laborers, whose sole qualifications were physical health and strength and willingness and ability to perform manual labor. The migration of European races to America's railways occurred in the following order: German, Irish, Poles, Swedes, Hungarians, Italians. It is to the latter race that we in the east specially must give attention as our hope for the future.

Speaking of Italians, General Francis A. Walker said: "They have none of the inherited tendencies and instincts which make it comparatively easy to deal with immigration of the older time." Others have described the Italian immigrant as "underfed, ill-grown, diseased, unskilled, illiterate, awkward, quiescent, lacking in responsibility, with a keen sense of inferiority, and the lack of ability to take advantage of new circumstances; their standard of living is low and they do not improve it when they prosper." Others plainly accuse them of being inexpressibly squalid and "unspeakably filthy."

"The states of Massachusetts, Connecticut, New Jersey, New York, Pennsylvania, Ohio and Illinois, with 37 per cent. of the population of the United States, producing 61 per cent. of the output of manufacturing and mining and 25 per cent. of agriculture, and employing 60 per cent. of the wage earners, attract and absorb 75 per cent. of the immigration of Italians and Slavs."

It is conceded, too, that it is no longer the strong and independent who come, but the weak and incompetent. The greater portion of the Italian immigrants comes from the south of Italy and from Sicily. They are almost always farmers who in their native land have lived in crowded villages and walked back and forth long distances, being employed by the land owners. Naturally, on arrival in America, they have crowded into the large northern seaboard cities, among their own kin, until now the "Italian quarter" in every large eastern city has well defined boundaries. They come, indelibly stamped with their agricultural peculiarities and primitive methods. Among themselves there is a certain amount of "caste," the Neapolitan, for instance, scorning the "little black people" from Sicily. Necessity has developed frugal habits, and work with his hands for long hours in the sun has inured the Italian to hardships in America which he survives in spite of his surroundings and the results of his ignorance, superstition and heredity. The strongest characteristic of the Italian is his thrift, which is second only to that of the Jew, and much is sacrificed to the accumulation of wealth. His idea of a gentleman is one who does not labor, and his ambition is to acquire a competency that will enable him ultimately to attain to that ideal. The home instinct of the Italian is strong and he will cling tenaciously to his own family and relatives. He is primarily a vegetarian, his principal diet being dry bread, vegetables, cereals, greens, cheese and fish, and infrequently the cheapest meat chopped up into a stew and highly seasoned with peppers, garlic, mint, onions, etc., with olive oil and peanuts as delicacies and beer and sour wine as beverages.

The crowded dwelling naturally results in unsanitary conditions and the promiscuous storage of food and clothing in the same compartment where they "live, move and have their being" results seriously to their health. The death rate is high, especially among the children, and they are very susceptible to contagious diseases. Their clothing is usually of the cheapest grade of cotton in gay, primary colors, with little to suggest the art of the old Italian masters.

Their great vices are lying, stealing and fighting. They are primitive in their display of anger, but have a profound respect for, or rather fear of, law. Their virtues are that with those in whom they have confidence they are faithful, steady and sober, social and cordial, essentially honest in paying their debts and very appreciative of kindness. They are imitative and economical, and while slow to learn and often persistent in following accustomed methods in spite of protest, they may be taught "to make their heads save their heels" and to do things right.

The men of the second generation are much more apt and better fitted for work requiring skill, and if not attracted by the quick returns and excitement of factory life, become the more efficient laborers and foremen. Uneducated labor is never efficient, but the Italian is as good as were the ignorant among the Irish or Germans, and the difficulties the foreman of these older migrations have had in mastering the Italian or the "sign" language has been responsible for much of the prejudice against the "Dagoes." Failing to convey his instructions in either of the above languages, the foreman usually resorts to choice and violent invective and profanity in his own.

One of the objections to the Italian laborer is the large number of holidays which he feels he must observe. Essentially religious, he is faithful to this feature of his creed and observes all the feast and Saint's days, especially the one on July 16. In addition he celebrates by resting on all occasions of marriage, death, births, christening, etc. Fond of display, he will join societies which have gaudy uniforms and parade.

Prior to the laws of the early '80s restricting immigration, the Italian was the victim of most flagrant extortion and abuse. The act of Congress of July 4, 1846, was largely responsible for the padrone system. This act authorized contracts pledging wages to pay the expenses of immigration, and while it was repealed in 1868, it started the contractors and agents from this country to Italy who spread broadcast glowing visions of untold wealth, and inaugurated a system of plunder that to a certain extent exists today in spite of the most earnest and efficient efforts of city, state and federal authorities to suppress it. After 1885 the Americanized Italian of the first importation, shrewder, cleverer and more unscrupulous than his fellows, improved on the system by which he was fleeced, and by correspondence with agents in Italy and by many evasions of the laws, soon had a stream of immigrants coming and going and reaped a rich harvest of graft both ways. The enforcement of the contract labor laws in a measure changed this, but the Italian comes today with the knowledge that he can go to the Italian quarter and find employ-

*Three articles in the *Railway Age Gazette* of June 21, 1912, page 1568, discussed "The Hobo as a Track Laborer," and four in the issue of July 19, 1912, page 121, discussed "The Negro as a Track Laborer."

ment more lucrative than that at home in spite of all the cheating and extortion.

Some traces of these practices are shown in some of the charges which disgruntled laborers even today make against their foremen, such as charging for jobs and charging commissions on railway tickets, high rate for board and high prices for provisions, padding payrolls, unjustly discharging, and shipping men ahead of time and charging rent or board. These are but a few of the most conspicuous abuses, and through it all the wily padrone advances them cash freely and poses as their benefactor. Conditions have been greatly improved. While they use the labor agent, large employers of this class of labor surround him with certain restrictions. Deductions from payrolls are limited and safeguarded. Rules and regulations for laborers printed in both English and Italian help them to defend themselves. The sale of money books or tickets to men who give orders on their pay simplifies the book-keeping, and competition among the labor agents fosters better treatment of the men. The reduction of the hours of service and of sundry work, the better regulation of discipline, the introduction of saving, relief, pension and insurance plans to which the Italian is eligible, are all helping to attract and hold the better class of them to the service as against the allurements of city life.

The following table is indicative of the extent to which the Italian has entered into railway service on a typical eastern division and will do so in the future:

| | Foremen. | Assistant Foremen. | Track-walkers. |
|---|---|---|---|
| Total number | 112 | 62 | 119 |
| English or American | 38 | 5 | 11 |
| German | 19 | 0 | 6 |
| Slav. | 0 | 3 | 0 |
| Irish | 17 | 8 | 0 |
| Italian | 38 | 46 | 90 |
| Average age | 43 | 32.6 | 36 |
| Average years in service | 18.5 | 7 | 8 |
| Oldest | 68 | 55 | 67 |
| Youngest | 26 | 22 | 21 |
| Number who read English | 105 | 33 | 28 |
| Number who write English | 104 | 33 | 25 |
| Number who talk English | 112 | 57 | 114 |
| Married | 103 | 41 | 90 |

The assistant foreman of today will be the foreman of tomorrow, and he will be succeeded by the trackwalker. Who will take his place? The answer depends on the roadmaster or engineer of today. He must devote a large part of his time to the selection and instruction of men for these positions. These things can no longer be left to the section foreman or to the man's own initiative, nor will correspondence school methods avail. To be successful the instruction must be personal, careful and persistently applied to the particular needs of the candidate. If this is not done there is little hope for a better class of labor or supervision in the future to meet the increasing demands for efficiency in this most important branch of railway work.

The supervisor or roadmaster who aims to succeed must devote a large part of his time to close association with the Italian laborers. If he gets the men direct from the ship through a labor agency, he should avoid employing an Italian interpreter or assistant foreman. Unless previously known, such a man will usually be found to be a fakir and trouble maker who will sooner or later rule or ruin. It is better to struggle along with the sign language than to have such a man as a "go-between."

One of the old foremen should be placed in charge, with one or more older laborers as assistant foremen and pace makers. The men should be comfortably housed near a supply of water, preferably a running stream. The supervisor should avoid separating families or groups. They are clannish, and it is best to recognize that fact and to let them see that this is done. He should learn who the leader is in each group and gradually hold him responsible for the work and for the conduct of the group, and he can also obtain the influence of the group in restraining an unwise leader. He should see that the provisions furnished are clean and wholesome, and regularly and conveniently supplied, and that the men are not overcharged. The fact that he takes a personal interest in their welfare makes a strong impression on Italians.

In teaching them to work his way, he must show them how over and over again. He cannot tell them how because they do not understand his language, or he, theirs. He can be much more eloquent and expressive with his hands. They will persist in grasping the hammer handle close to the head, or the left-handed man will try to shovel where a right-handed man ought to work, but the foreman or supervisor should be the efficiency expert and patiently and kindly, but firmly and persistently, teach him the right and the easy way. Remembering that they have no mechanical sense, he must teach them the fundamental principles of the lever, etc., and how to apply their strength to obtain the greatest result. Some will impatiently scorn such instructions, and in such a case a little competitive object lesson will soon bring good results.

Italians will huddle together and chatter while going through the motions of working. To get the best results they should be scattered just enough to enable the foreman to measure the work of each man or each group, and by judicious competition stir up a little rivalry. Too widely scattered, they are in great danger of injury. Many of them are not wilful loafers but stupid plodders, and these have to be told when they are done, and what to do next.

In handling rail, the Italian shows to great disadvantage even after years of experience. If using tongs they will pair up tall and short, heavy and light and walk on each others' heels or try to carry at the center of the rail. In picking up rail by hand there will always be the odd genius who will be on the wrong side or who will hang on to the rail after all the others have let go. In throwing or dropping rail they all want to give the word. They never straighten up with the load, but walk doubled over, possibly thinking to save themselves work by not lifting it so high. In other forms of concerted effort the Italian particularly is stupid and needs training. When one of them is injured the whole gang usually quits either through fear or anger or from a general desire to talk it all over. Often the gang will seek to punish the ones whom they think responsible. Sometimes they quit and clear out bag and baggage. Nothing but patient diplomacy and a genuine display of human sympathy and kindness will be effective in such a case. The Italian is not greedy or a schemer, and the "ambulance chaser" usually gets a cool reception.

If the Italians are not all killed by the Turks, or do not all emigrate to Africa, they will bear the brunt of the battle for improvement in America's railways for many years to come, and it therefore behooves the managements to give greater attention to the education of its Italian trackmen.

## SELECTING FOREMEN ADAPTED TO ITALIANS.

BY FRANK M. PATTERSON,

Assistant Engineer, Chicago, Burlington & Quincy, Chicago, Ill.

If the average person who has to do with maintenance of track is asked to write a discussion on the good Italian laborer, he will probably be tempted to paraphrase the famous treatise on "snakes in Ireland" and assert that there are none. One must be a lover of argument, indeed, who will attempt to prove to the contrary, and yet we have the Italian as an ever growing problem, and will probably have him as such for a long time to come, and it may be well for us to cease our complaints and cast about for some means to improve this class of labor, with which at the present time, and under the present conditions, we cannot do without.

The principal objections to the Italian are inefficiency, both physical and mental, clannishness, a lack of loyalty to his employer, and a tendency to shirk by pretending not to understand the order of the foreman, or when not closely watched. In addition to these general indictments, complaint is often made that he is quarrelsome and hard to manage, although so far as the writer's experience is concerned the responsibility for this lies as often on one side as on the other.

Granting that all these charges are true, and it must be ad-

mitted that the prosecution has made a strong case, it is very necessary that we remedy our own lapses and eradicate as far as may be the faults of the laborers. To accomplish this it will be necessary to use greater care in the selection both of the laborer and the foreman who is to direct him. When a railway buys labor why should it not inspect it as carefully before delivery as it does anything else it buys? Indeed, as the cost of labor is one of the heaviest items of track maintenance, why should not even more attention be paid to selecting labor than is paid to the inspection of much of the materials used by these laborers? Again, in selecting foremen for certain gangs why should not the ability of the foreman to handle certain nationalities be as important as his ability to perform certain kinds of work? It has long been recognized that the main qualification of a good foreman is his ability to handle men. If this be true when the gangs are composed of men capable of understanding the language spoken by the foreman, and more or less familiar with the work they have to do, it is much more important when the orders must be given through an interpreter to men who are almost totally ignorant of the work before them.

To illustrate what is too often a typical case, one sees a number of Italians coming to this country through arrangements which are in violation of the spirit if not the letter of the alien labor law, reporting to the padrone and being shipped out to some railway which has put in an order for a certain number of men. Arriving at the job, and totally ignorant of the details of their work, they are put in charge of a foreman who could not qualify as a diplomat, however great may be his ability as a trackman. Under such conditions it is no wonder that little is accomplished, and that sooner or later the gang is "fired," another gang sent to replace it and the whole sorry business repeated. It would be bad enough if the only loss in an experience of this kind were the temper of the foremen and the jobs of the men. But the damage goes further, and represents a distinct economic waste to the country at large; for in addition to the loss of his temper the foreman is apt to lose also his ambition and to become a drone who does his work not because he hopes to excel in it, but because it is the only thing he can do; while the trackmen are deterred from becoming good workmen and good citizens. The railway has suffered a loss that is shared alike by its owners and the public.

The immigrant from the north of Italy is superior in every way to his compatriot from the south, the Sicilian, and arrangements can often be made with the padrone to furnish the former class. If the railway has an agent in charge of securing labor he can usually do this better than if orders are placed indiscriminately. As far as possible the season's work should be so planned and materials so furnished that work may begin as early as the weather will permit, thus enabling a close estimate to be made of the labor requirements. Gangs may then be recruited while the visible supply of men is large enough to allow of some discrimination.

The selection of the foreman should be governed by his previous experience in handling Italian labor, or if he has had no such experience, by the possession of characteristics that indicate he will be able to handle it successfully. Chief among these characteristics should be capacity for organization, patience and firmness. The roadmaster or supervisor can render great help by practical advice, and should do so at every opportunity. Above all, the foreman should be impressed with the fact that a little time and patience expended in getting the gang started right will be repaid many times over when the work is in full swing. Of the two best Italian gangs the writer has known, one was in charge of a man of Swedish birth, by no means young, who had been for a number of years a successful foreman of English speaking laborers, and the other had for its foreman a young man of American parentage who had little experience in charge of extra gangs. Both of these men possessed in an eminent degree the qualifications previously referred to, and as a result the work of their gangs stood out in pleasing contrast to that of other gangs composed of practically the same class of labor. On the other hand, an instance is known of a young foreman who had shown marked ability in charge of English speaking labor, who was very unsuccessful with Italian labor, simply because he had not the temperament needed to handle Italians.

In large gangs it is economy to have plenty of assistant foremen, and when one of the laborers shows special aptitude it is often good policy to select him as an assistant. But care must be taken to see that he does not abuse his position by graft and that factional jealousies are not aroused.

With all the varying degrees of inefficiency found in Italian gangs they have at least one virtue in common. They can be depended on to put in full time. In an emergency they lack the spirit that makes a wreck or a washout a sporting proposition to the "white" labor, but on the other hand they also lack the sportive instinct that makes payday a signal for depleted gangs among the "hoboes."

Of the interpreter the less said the better. In many gangs he is a necessary evil, but one that should be tolerated so long as the necessity for him exists. As a rule he is a grafter, and grafts alike on the railway, the padrone and the laborers as the opportunity presents itself. In addition, he is often a trouble maker. For a railway employing large numbers of Italians it would be a better plan to select a corps of the better class of laborers and distribute them among the gangs in the dual capacity of interpreter and assistant foreman. This would make for better results by furnishing a leader who would be familiar with the railway's methods and standards and providing an interpreter in whom the foreman might have some confidence.

## DIFFICULTIES WITH ITALIANS AS TRACK LABORERS.

BY G. M. WALKER, JR.,

Division Engineer, Kansas City Terminal Railway, Kansas City, Mo.

The Italian laborer as a track man has not proved as successful as some other classes of foreign laborers and is far behind the classes used almost entirely by the railways, especially of the northern states, up to 15 or 20 years ago. His clannishness makes him undependable in emergencies, as the dissatisfaction or discharge of one man in a gang may cause the entire gang to quit. The necessity of the work to the company by which they are employed has no influence with them, for once they make up their minds to leave, it is impossible to stop them. Everyone seems to be related to every other one in a gang, if not by blood, certainly by religion. They will stand little or no abuse from their foreman, for however stupid they may seem about receiving orders in English or a language foreign to them, they will immediately recognize an oath or abuse of any kind, no matter in what language it is spoken. Practically all of them carry concealed weapons of some kind, and they are not slow to use them when occasion offers.

On the work they keep in bunches, and it is hard to separate them into small gangs. In work train service, especially, they are very careless and as a result serious accidents are of frequent occurrence. When they are warned of their danger they will make no move to get to a place of safety. These accidents became so serious on at least one road that the Italian laborer has been barred from it.

Italians nearly always require an interpreter and pay him a certain amount each month to look after their interests, and when possible buy all of their provisions, clothing, etc., from him. This interpreter is also paid by the railway company as an assistant foreman, but as a rule he simply transmits the foreman's orders to the men. Occasionally an Italian can be found who makes a good foreman and who can get as much or more work out of his men than an American foreman can.

Conditional supervision is necessary to prevent grafting between the interpreters and the foremen in the way of buying jobs for the men or for the interpreters themselves. Every time a new job is obtained for the men the interpreter taxes each of

them at least one dollar. This is quite an incentive for the interpreter to pull his men off from time to time, even though there are no differences between the men and the company.

The Italian is a fairly good "feeder," his diet being Italian bread, macaroni, cheese, onions and meat (preferably mutton). Each man or small group of men, usually composed of members of one family, does his or its own cooking, except that they do not make their own bread. If they are not near an Italian bakery they will have their bread shipped in coarse jute bags where it collects a large amount of dust and filth. There seems to be little drunkenness among the Italian laborers, their main alcoholic beverage being wine.

The amount and quality of the work obtained from the Italian depends largely on the foreman, as is the case with other classes of labor. One way to increase the amount of work is to have other classes of labor in the same gang, but separated from the Italians. A suggestion by the foreman that the other men are accomplishing more will frequently stimulate them to greater activity. The more intelligent of Italian laborers make fairly good yard men for the maintenance of switches, crossings, etc.

In general, I would place the Italian laborer as being a fair average of all the foreign classes of laborers, being above some and below others; but on account of his carelessness in looking out for his personal safety he is more undesirable than almost any other class.

## PECULIARITIES OF ITALIAN TRACK LABORERS.

BY A. SWARTZ,
Formerly Division Engineer, Erie, Huntington, Ind.

The problem of track labor is one of the most serious confronting the operating officer on practically all railways. Italian laborers are more generally used on lines east of the Missouri river and north of the Ohio than elsewhere. They present to the maintenance department its greatest study, for they are as a whole a discontented people.

It is almost impossible to use them in small squads on sections, for as a rule they are very closely related and will not separate. In consequence they require employment in gangs usually too large to be efficient on routine section work. They therefore need very careful watching, for they are naturally lazy and in large gangs can more easily shirk their work. Trouble makers are present in nearly all gangs, and when a foreman tries to weed them out he is apt to find that they have such a hold on the gang that the gang will quit unless the supervisor gives in to them, which immediately leads to more trouble.

Many times the interpreter has a control over the men, and sometimes he is the trouble maker without it being known by the man in charge. In many instances instead of helping the foreman, interpreters hold the men back and tell them not to do a good day's work.

Italians must of necessity be provided with bunk cars, the fitting up of which costs from $12 to $20 each. They must be furnished with fuel, and if coal is not handy they are very destructive of property which they can use for fuel. They are uncleanly and need constant watching to enforce cleanliness and proper maintenance of their camps.

Serious trouble is often caused by the depredations of Italians on neighboring farms, even though they always disclaim any such misconduct. They must be given transportation from their winter homes in the large cities to the site of the work, and when the work is completed they are usually furnished transportation back home again.

A great deal of graft is possible, and foremen who are above this must be selected. If the foremen will accept graft, the men will only too willingly give it, expecting in return to be allowed to take life easy and be given time to lay off to visit relatives in other gangs, to wash their clothes, to stay home when they think they are sick, etc. In their native country they have such a system, and they can see no reason why it should not be so here. Trouble from this source is growing more acute in this country, and one way to stop it is to pay the foremen better wages.

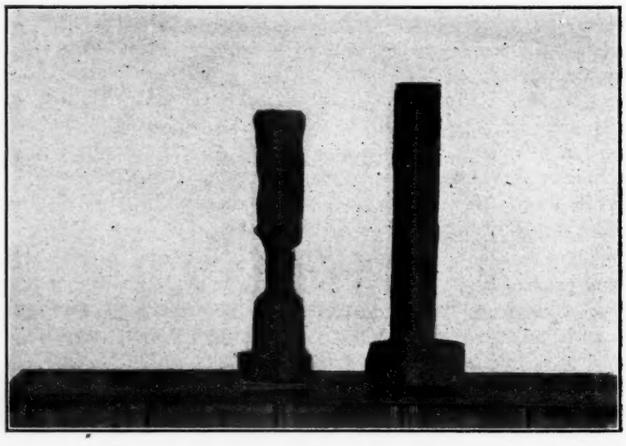
Unreliable labor agents cause a great many of the above-named conditions by reason of their practice of shifting men from one division or gang to another division or gang. It is a question whether labor agents are beneficial or detrimental to a railway. If the agent exacts a fee from the laborers, and furnishes their supplies, he is under a considerable expense. He necessarily tacks a large part of this expense to the cost of the supplies, which causes discontent among the men. Still, because of his organization, he is able to get more men than the road-master could get by picking up gangs himself. If one goes to a number of different labor agents for men he hardly fares any better than when dealing with one agent exclusively, for if these agents are to furnish only one or two gangs they rarely take pains to try and get good men, as one agent may be expected to do when asked to furnish men for an entire division or system. If one goes still further and picks up gangs wherever possible, he is generally better off, for he then deals directly with the interpreter only, who holds his gang by his personality.

The writer does not mean to convey the idea that all Italians are alike and no good at all, for there are a great many who make first-class laborers, especially in large cities where they are assured of steady work the year around. On main line work one oftentimes finds gangs that give a fair day's work and who come back year after year. However, each year there are new faces in even these gangs, for when they get money enough they go back to Italy and stay.

Because of their ability to live cheaply Italians can afford to work for less than American labor and some other classes of foreigners. However, in the writer's opinion, the railways would be much better off if they would abandon this class of labor, generally speaking. Let them raise wages, establish better camps, run their own commissaries, have their own labor bureaus, attract English-speaking people, and track labor conditions are bound to improve and the cost to be reduced.

## INSPECTION OF HEAD ROD BOLTS.

The importance of making careful inspections of head rod bolts to detect and eliminate lost motion in the head rods of switches is well illustrated by the accompanying photograph showing two ¾ in. x 3¼ in. bolts used on 75 and 85 lb. rail on the Houston and Texas Central. The one on the right is a new bolt, while the one on the left was put in track in 1902 or 1903. While inspecting switches the section foreman observed considerable lost motion in the head rod of a switch, and on investigation found the bolt worn as shown in the photograph. Examination of other head rod bolts showed that practically all of them were in similar condition. The photograph of the worn bolt shows a shoulder which was taking all the wear at the time of removal, this shoulder having been caused by the nut being tightened and the end of the bolt battered at some previous inspection.



**Worn and New Head Rod Bolts.**

## BRIDGE RENEWALS ON THE PENNSYLVANIA LINES WEST.

A number of wooden Howe trusses on the Louisville division of the Pennsylvania Lines West have been replaced with steel girder or truss spans during the last few years, and in the work of replacing these bridges considerable care has been taken to eliminate the necessity for heavy false work, and also to economize in the use of work trains by substituting a light maintenance derrick car whenever possible. Two examples typical of the methods used in this work are illustrated herewith.

In the first case, shown in Fig. 1, a 146-ft. 5-in. Howe truss and three spans of trestle approach were replaced by three deck girder spans, one 40 ft. long and two 70 ft. long. A spur track was built immediately south of the old bridge, and from this track all material used in the work was handled by the derrick car under its own power. This car is similar to the one described in the *Railway Age Gazette* of July 21, 1911, and mentioned in connection with another bridge renewal problem described in the issue of September 15, 1911. The masonry was first completed and the iron bent for the central girder support was erected on the new pier. The 40-ft. girder replacing the old trestle approach was placed in the usual manner. Two additional floor beams were inserted in each panel of the old truss and the truss was raised about 20 in., the elevation of the rail being kept constant by removing the ties and stringers and spiking the rails directly to the floor beams. The two main girder spans were assembled and floored on the spur track and were put in place on two successive Sundays when a period of 5½ hours between trains was available. A yard engine was brought 10 miles for the purpose of moving the girders. The rails, floor beams and lateral bracing of the old bridge being removed, the girder spans were lowered into place with jacks, the track was replaced and the load carried on the girders. False work was then driven under the Howe truss and it was dismantled and loaded. As shown in the illustration, this false work was very light, as it carried only the dead weight of the old truss and was only in place for a short time.

In the second case, shown in Fig. 2, a 160-ft. through truss was replaced by two half through girder spans, each 80 ft. long. The delivery of the iron was contracted for in December, making it certain that work would be under way during the winter season when trouble can be expected from running ice and drift. All the masonry work was completed during the early fall except the portion of the abutments under the old through truss. Three heavy cluster pile bents were driven adjoining the abutments and the center pier on the down stream side, being anchored to bed rock and built strong enough to carry the girders under traffic. A light trestle was erected between these cluster bents 18 ft. from the main track center to center, and a spur with a capacity of three cars was built north of the bridge, the fill being widened for the purpose. When the girders were received the four cars were set on this spur and the girders unloaded and placed with cribbing and jacks on the new masonry and the cluster bents. The division derrick car worked on this track under its own power, placing the floor beams and stringers and removing the light trestle as it receded. The riveting and flooring of the girders were then completed and the fill was widened south of the bridge so that the main track could be carried around the old bridge over the new girders. This track was used at a speed of 10 miles an hour during the dismantling of the old truss. As the derrick car had the freedom of the old main line for the dismantling work there was no necessity for the use of travelers or work trains. The trestle that had been removed from the run-around was driven under the old truss to support it during dismantling. When the truss had been removed and the bridge seats finished to conform to the masonry plan, the girders were moved sidewise into place between trains and the main track restored to its original location. While this work was under way there were two floods, clearing the stream of heavy ice, and on neither occasion was there any false work in the channel to obstruct the flow. This work was done under the direction of D. B. Johnston, division engineer, to whom we are indebted for this information.

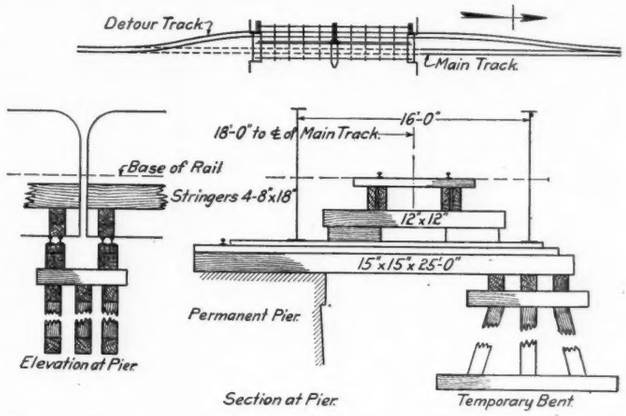



**Fig. 2—Method of Supporting Temporary Track at One Side During Construction.**

PATINO-CHIMORE RAILWAY, BOLIVIA.—A new route for this line has been recommended from Cochambamba to the Chimore river, via Sacaba, Tiraque, Pocona, Totora, and the San Mateo or Ichilo river.

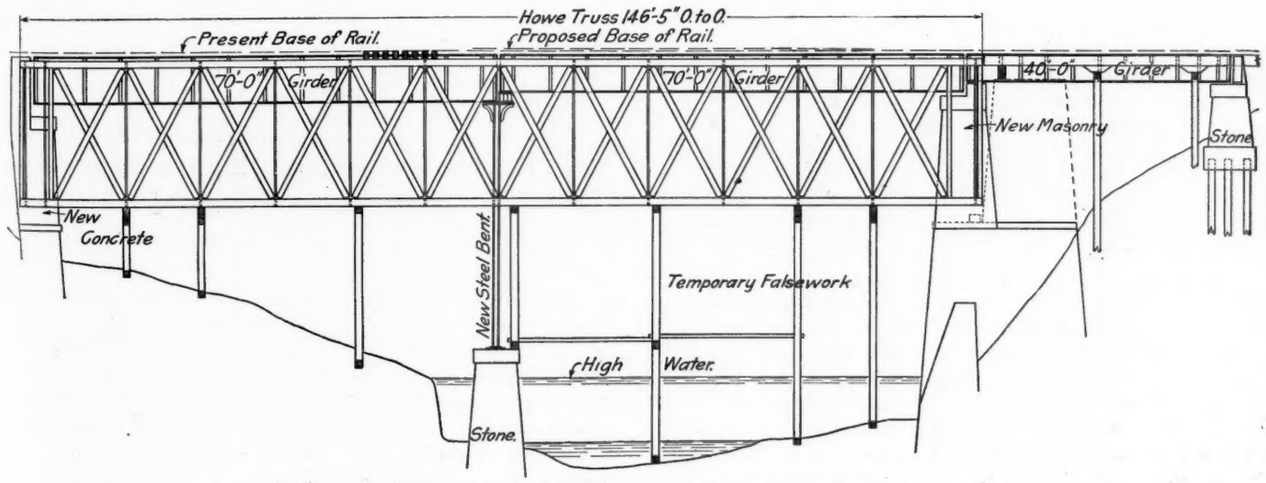
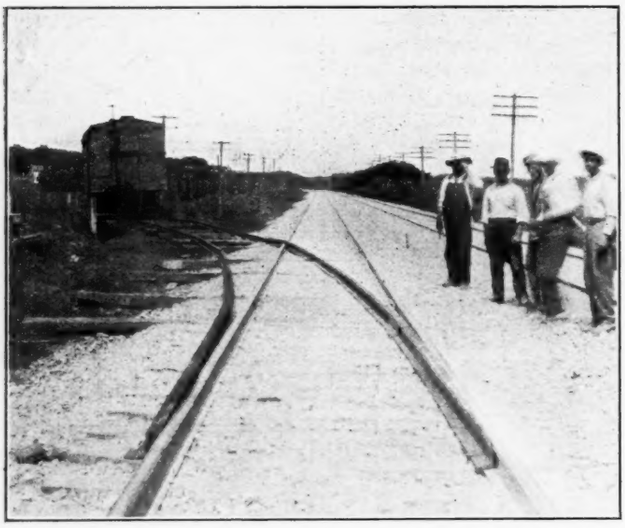



**Fig. 1—Replacing a Howe Truss With Plate Girders.**

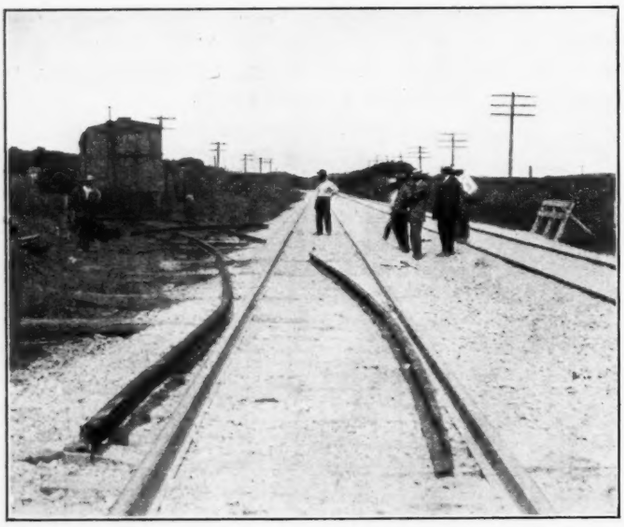
## A FROG AND SWITCH FOR TEMPORARY SPUR TRACKS.

The desirability of moving bunk cars for extra gang laborers at frequent intervals so they can always be located at points convenient to the work, and the danger and difficulty involved in cutting the main track to spur out such cars has led P. J. McAndrews, roadmaster on the Chicago & North Western at Belle Plaine, Iowa, to develop a frog and riser rail switch for a tem-



**Switch Set for Spur.**

porary spur which can be used without disturbing the main track. The switch is an adaptation of the Wharton principle and is made of a standard 15-ft. switchpoint and an outside riser rail. This riser rail has the base cut away on one side for about half the length of the rail, so that the head fits against the head of the track rail close enough to engage the tread of a car wheel and the end is bent down enough to raise the flange



**Main Line Clear.**

of a wheel over the head of the track rail. In place of a frog a jumper rail is used which has the base and web cut away for a length of about 15 in. near the center of the rail and which is laid over the track rail by turning it across the track, dropping it and then turning it back into place with the flanges resting on the flanges of the track rail and the under side of the head resting on the head of the main rail. The jumper rail is bent to the same curvature as the road's standard 9-deg. turnout, which is between a No. 6 and a No. 7 frog angle. The cutting and bending of the jumper rail and the riser rail were handled by the section gang in the Belle Plaine yard using any available 90-lb. secondhand rail. The outside rail can be sufficiently supported by inserting a tie between every third or fourth track tie, as the only load that the spur is required to carry is empty cars. When the spur is spiked into position for use it is very easy to remove it, if the necessity occurs, by pulling the spikes at one end of the riser rail and at the switchpoint and at both ends of the jumper rail. The main track can be cleared in about two minutes. As the switchpoint and riser rail now in use are left-handed the set can only be used for lefthand spurs, but by providing a righthand switchpoint and riser rail and by turning the jumper rail and the other curved rails around the set can be used as well for righthand spurs.

## EXTRA GANG WORK.*

BY M. GAULEY,

Roadmaster, Atchison, Topeka & Santa Fe, Argentine, Kan.

I endeavor to give the extra gang work to the section foremen who remain on the division, and in doing this I feel as though I give these foremen an advantage in learning how to handle extra gangs and different pieces of heavy work. It is the duty of a roadmaster to be able to go on the ground and handle the gang for the section foreman and to get the men started right. Of course where there are a number of extra gangs on a division, the roadmaster in some cases will have to hire outside foremen.

I like to use negro laborers for laying, loading and unloading rail, but for other work, I never gave the matter of adopting the laborers to the work any consideration. I do not see that there is any particular difference in any of the foreign labor. In some gangs of foreign labor there are too many old men and boys, and if a foreman discharges one of them the whole gang quits. This is brought about by the interpreter. The apparent quality of the men depends principally on the ability of the foreman. If the laborers are full grown, able bodied men, there is no reason why one nationality will not do as much work as another, on an average. I much prefer the negro laborer for handling rail, where the pay is sufficient to keep a good class of negroes, as it reduces the number of personal injuries. Of course it would be much better to have good white laborers, provided wages could be paid to get a good class of men.

I do not advocate the policy of assigning a man a certain job and then permitting him to stand around, only taking care of that certain job. A great many times in surfacing gangs, the man that handles the jack virtually does nothing else but run the jack. The only exceptions that I make are the men that handle rail tongs, setting in and setting out rail. I always permit these men to rest, as the work is heavy and wears them out. I find that the less the foreman assigns certain jobs to the men with the expectation that they will do nothing else but that certain work, the better off and the better handled the gang is.

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Local Manufacturers on Indian Railways.—Purchases of car frames and bodies built by Indian firms continued to be made during 1911 by the Indian State Railways. A government test house is being built and is nearly completed at Alipur, near Calcutta, under the superintendence of local manufacturers, with the object of carrying on mechanical tests of metals and of cement purchased in the local market for the railways. It is also intended to have chemical tests performed in this test house. A government laboratory is also being erected and built at Kalimati, on the Bengal-Nagpur Railway, in order to test the steel rails made for the government railways by the Tata & Sons' Iron & Steel Works.

*Received in the contest on The Organization of the Extra Gang, which closed April 25, 1912.

# THE COST OF A TREATED TIE.

**A Discussion of the Results Secured by the Use of Preservatives with Relation to the Expense of Treatment.**

BY D. BURKHALTER,
Superintendent Creosoting Plant, Buffalo, Rochester & Pittsburgh, Bradford, Pa.

The actual total cost of a tie to a railway company depends on its first cost and its life. The factors of first cost of a treated tie that can be controlled to some extent, at least, by the purchasing company are, (1) the selection of the timber; (2) the degree of treatment and (3) the type of rail fastening and tieplate. The amount that can economically be added to the first cost of a tie to increase its life a given length of time can readily be computed for any case, but it is very difficult to estimate in advance how long a tie will last or to determine which of the causes of wear and decay will cause its removal from service. The ties in track today are actually inferior to the ties of a few years ago, and as the total amount of money spent annually in the tie business is about $120,000,000, any small improvement in the service secured from ties becomes great in the aggregate.

It is very desirable that ties give a uniform life, although such a condition is far from common. A hard wood switch set usually shows after a few years that some of the ties are ready to come out and others show no signs of deterioration. The seriousness of this uneven support for rails and equipment can only be partially estimated. To obtain a greater uniformity of life ties should be graded and distributed according to the requirements of the service. Sharp curves should have hard wood ties and the best quality of rail fastenings. Tangents with inferior drainage could safely be provided with softer ties, which naturally absorb a larger amount of preservative, and with which expensive rail fastenings are not so necessary.

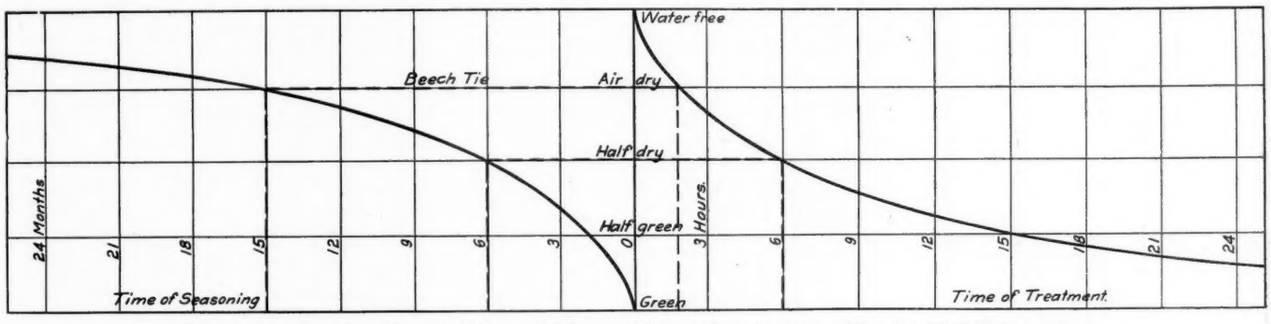



**Fig. 1—Curves Showing Relation of Time of Seasoning to Time Required for Treatment.**

The uniformity of life of ties in service is to some degree increased by the use of preservatives, the porosity of structure, which, in the untreated state promotes decay, being in the same degree a measure of the tie's absorption of preservative. There is a relation between the way ties behave in a treating retort and the way they last in the track. Roughly speaking, the drier the tie the more preservative it will absorb and the more preservative it absorbs the less the chances for its decay. A diagramatic presentation of this relation is shown in Fig. 1. The hours of pressure necessary to force into the tie the required amount of preservative are plotted horizontally to the right of the center and the months of seasoning are plotted to the left. The vertical scale represents the loss of weight during seasoning, the distance between the two horizontal lines corresponding to the entire water content. The horizontal scale of the right hand curve depends upon the species of timber and the viscosity of the oil, and the horizontal scale of the left hand curve depends upon the climate and species of timber. The point which is brought out by the curves, however, is that greenness impedes treatment to a very disproportionate extent. The curves do not break toward the vertical very rapidly until they pass the half dry stage. By the use of such curves plotted for a given set of conditions it is possible to show the length of time required for preserving ties which have been allowed to season for various lengths of time, and conversely the amount of seasoning needed to allow a tie to take the preservative treatment in various lengths of time.

Octave Chanute said that sorting according to seasoning was at least as important as sorting by species. It is, of course, logical to put all ties in storage until they obtain the same degree of seasoning, but this is oftentimes impossible. In some climates, and perhaps with some species of ties it is necessary to treat all the timber at a stage of uniform greenness to prevent decay starting before the treatment is applied. This, however. is purely an emergency measure. There is a much greater risk in treating green ties on account of the uncertainty as to what any particular tie will absorb. The capacity of a retort running on green ties is decreased tremendously, and if attempts are made to increase the output they usually result in the securing of a shell treatment, leaving the inside of the ties saturated with moisture. There may be water pockets left in the wood and the distribution of creosote is apt to be uneven, due to the local effect of heat.

A record of tie removals is an exact parallel to the experience table of an insurance company which is compiled with a care commensurate with the money involved, the calculations being not theories, as might be supposed, but products of the best mathematical skill. In Fig. 2 is plotted a typical mortality curve taken from a table of the British Actuaries' Society based on 100,000 healthy males over 10 years of age. It should be noted that the causes of death in this table are not only old age, but occupational diseases and hazards of all kinds. Each sinuosity in the line indicates some hazard which is particularly active at a certain period in life. Such a curve is exactly similar to a plot of the number of ties removed from a track each year. The question is often asked as to the average length of life of a tie if decay were the only destructive agent and as to how great are the deviations from the average due to the natural difference in vitality among individuals. In the same figure on the ordinate of 70 years a probability curve is plotted which indicates how a curve of the deaths due to old age alone would appear. According to this theoretical curve the greatest number of deaths occur at the average length of life of the species and the variation from this average is known as the "measure of precision" of this probability curve which is commonly used in the method of least squares. Its equation is $y = k\ e\ -\ h^2\ x^2$, the variables in this equation when applied to the life of ties being determined by the species of timber and the process of treatment. Hardwood timber usually grows in a "mixed stand," and hence

the value of "the measure of precision" for such woods would be large. Conifers usually grow in a "pure stand," so that their individual variation from the average is much less. In the case of ties, destruction from decay alone is exceptional and the theoretical curve is always modified by physical conditions surrounding the ties in the track. Sinuosities appear in the curve due, for instance, to curvature, ballast, tieplates, equipment loads and standards of maintenance. Some actual curves plotted from yearly tie removals are shown in Fig. 3. Such records are very incomplete, and at present show signs of becoming more so, apparently owing to a lack of confidence in their value. Complete records of a thousand ties of one kind in a test track would no doubt give valuable pointers if "weak sisters" are put in to show how far weakness can be allowed. But the results obtained from such a small number could hardly be used as indicative of general conditions. The curve plotted is taken from removals on the French Eastern Railway as printed in Bulletin 41 of the Bureau of Forestry on The Seasoning of Timber. It was prepared to indicate the great success of the treatment of a relatively low grade timber, beech, as compared with a very high grade, Roumanian oak. Such curves are usually plotted in per cent. of total removals and the curve for oak has been replotted to show the number of removals each year. The practice of plotting these curves in per cent. of the total removals is bound to give a smooth curve, even if the removals in a given year drop to zero, owing to fiscal emergencies or the ambition of the officers to make a showing. Such a plot, therefore, is of less value than one showing ties removed each year, because its shape does not lend itself to the proper discovery of its characteristics. Irregularities in this curve should tell a definite story, perhaps of spike killing or poor original inspection. The curve for untreated oak plainly shows an "infant mortality" hump of, let us suppose, sappy sticks. Such humps represent a large loss of capital before any measurable return has been made, the seriousness of which will be more clearly brought out in discussing annual charges.

It has been suggested that ties be "renewed to face." This amounts to the application of the Osler theorem to ties. The relative cost of such a decision would be immediately questioned and the choice of the proper number of years' service to be taken from the ties and the value of the scrap material and wastage would be hard to decide. By the use of a tie mortality curve an interesting solution can be obtained, since it is possible by erecting an ordinate on any proposed number of years to determine the value of the remaining life and estimate both the scrap value and the waste incident to a change of position of the ties at that time.

In Fig. 4 is shown a curve of annual cost which is the amount that would have to be paid into a sinking fund to realize at interest $1 plus interest at 5 per cent. at any given year. This curve is very steep at the beginning, gradually becoming horizontal after 25 or 30 years, and it is this increasing steepness in the early years which so dearly penalizes early failures. The rate of saving increases with a decrease in the interest rate, but the amount increases with the rate. The slope of the curve

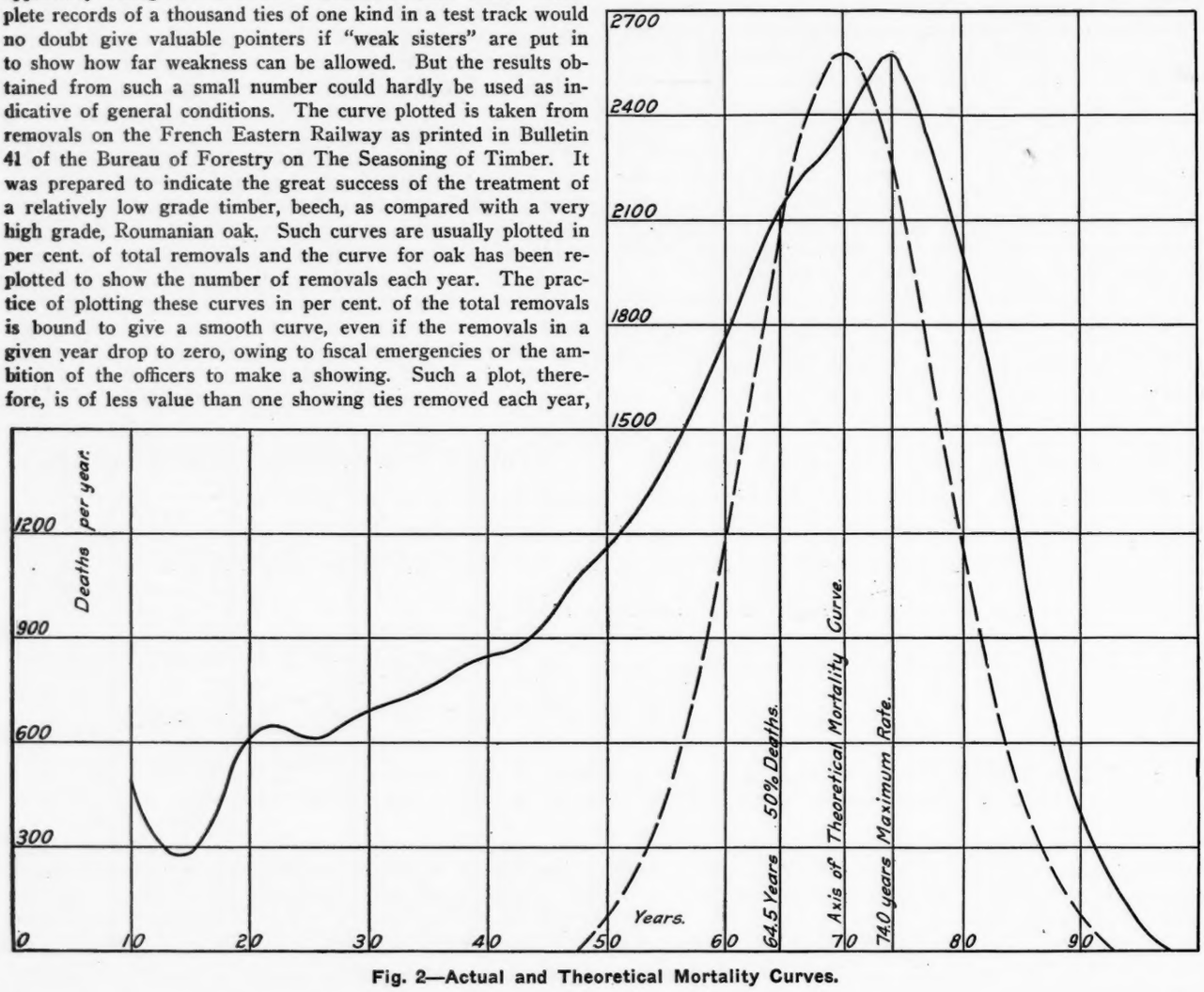



**Fig. 2—Actual and Theoretical Mortality Curves.**

accounts for the fact that the annual charge calculated on the average life of a number of ties is different from that composed of separate calculations for the lot removed each year.

In order to show the results in dollars and cents of various ways of operating a treating plant, Table 5 has been prepared, including the output of a retort for one month. The assumed performance of ties in the retort is taken from everyday experience. The assumed life of the ties in track would be correct for some parts of the country. It is desired to show the underlying principle and the accuracy of any particular figure is not so important. The ordinary treating retort holds 500 ties, or about two carloads, and the monthly output of the cylinder is taken at 80 runs, or 40,000 ties. As there are usually more than one kind of hardwood and a few soft wood ties in each car, some of which are well seasoned, and others recently cut, the assumed lot of ties is divided into seven classes and numbered for convenience in reference. The same seven classes are used

in considering untreated ties. The treatment is assumed to be one gallon per cubic foot, the creosote costing eight cents a gallon, weighing 8.883 lbs. per gal., and having a specific gravity of 1.0657. These figures are moderate, the specific gravity being a little high for green ties. The cost of the untreated tie is assumed at 45 cents, the cost of putting in track at 20 cents, and treating charges are estimated at five cents plus the cost of creosote. It is assumed that the cost of handling is saved by running the ties into the retort from road cars.

On the assumptions made as to the life of the untreated ties

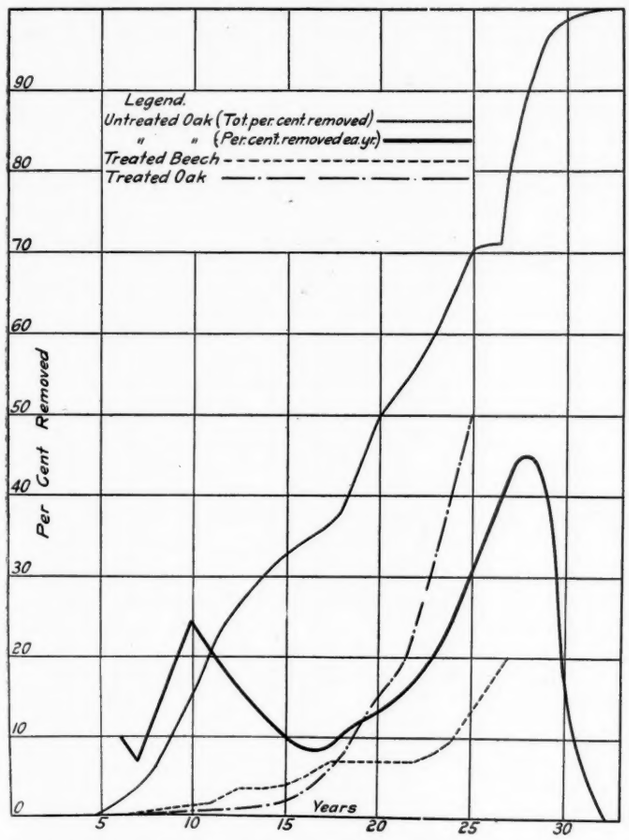



**Fig. 3—Curves Showing Tie Removals on the French Eastern Railway.**

the total number of tie-years obtained from these ties is 244,800, an average life of 6.12 years. The annual charge for a tie costing 65 cents and having a life of 6.12 years, as shown on the annual charge curve is 12 cents, and, if the ties taken out each year are figured separately this charge would be 13.74 cents. The total number of tie-years obtained from the 40,000 treated ties on the assumptions made is 566,670, giving an average life of 14.18 years, or an annual charge of 9.67 cents figured on the average, or 10.18 cents figuring each year separately. The average cost of the treated ties is 96.64 cents in the track. For each class of ties the number removed each year is assumed according to the theoretical mortality curve. For instance in group 5, untreated, which has an average of six years, the 8,000 ties are assumed to be removed 500 the fourth year, 1,000 the fifth, 5,000 the sixth, 1,000 the seventh and 500 the eighth. The annual charge on the ties taken out each year is computed by multiplying the number of ties by the cost of one tie in track, and that by the figure for that year taken from the annual charge curve. From these figures is obtained the total annual charge on all the ties in each group, both treated and untreated. By dividing this total by the number of ties in the group or in the whole retort the average annual charge per tie is obtained.

From the annual charges for each Group of treated ties it is seen that the charges on the soft maple in Group No. 1 is the highest. This is due to the fact that these ties have been treated beyond their mechanical life. The wood being soft absorbs 70 lbs. of creosote, but this treatment is not effective in prolonging the service of the tie beyond the average of seven years, which is determined by mechanical wear. About 45 lbs. too much creosote under the assumed conditions are being used in each tie, meaning a monthly loss of over $300. The difference in the value of hard maple, green and half dry, is very clearly shown in the figures for Groups 2 and 3, the annual charge when the wood is green, being almost twice as great as when it has been allowed to season. The loss in treating the ties of Group 4 is apparent since no greater life is obtained for treatment than before. A fact, however, which is not quite so apparent, but which is well known to treating men, is that the 12 lbs. put into the very green red oak ties produces very little penetration and the enclosed water tends to increase the liability to decay. The half dry timber classed as group 5 makes a much better showing, but on the assumptions made there is still a loss of about $1,000 as compared with the ties in Group 6. The old red oak in Group 7 takes too much creosote for an economical treatment, each tie getting an excess of about one gallon, which means a monthly waste of $64. If the ties in Group 2 were a little drier, and those in Group 6 a little greener, the output would remain the same and the average amount of creosote absorbed would remain the same, but the waste of creosote, due to the fact that the ties in Group 2 were absorbing too much, and in

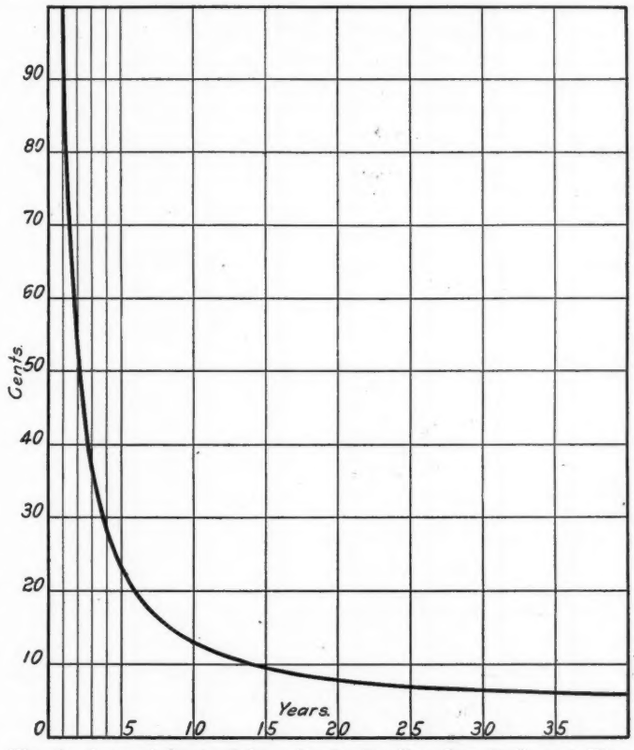



**Fig. 4—Annual Cost of Annuity to Realize One Dollar at Five Per Cent. Interest.**

Group 6 not enough creosote would exceed $15 a charge. The life of the ties in Group 6 on this assumption would slump to about nine years, increasing the annual charge to a figure about equal to that of the untreated tie. In many cases results due to causes of this kind are not brought directly home to the treating plant because of the failure to date all ties. It may be felt that some ties are not doing very well in the track, but there is scarcely ever a doubt as to their superiority over untreated ties.

On the basis of the average life of untreated ties, 6.12 years, and the annual charge on such ties of about 13 cents, it may be concluded by reference to the annual charge curve that a treated

tie costing about one dollar in the track must reach a life of more than 10 years to show any economy over the untreated tie. This length of life brings most ties about to the end of their mechanical life unless an effective remedy is applied in the form of a properly designed tieplate. If such tieplates cost 25 cents a pair and the expense is all charged to preservation, the length of life necessary to show economy for the tie plated treated tie is increased to about 13 years, and the small profits of mediocre preservation are practically wiped out. If, however, by the proper handling of the treating process the average life is increased to 16 years without appreciably increasing the initial expense, the annual charge drops 3½ cents on each tie, a clear saving of $1,400 for every month the retort is run.

TABLE 5.

| Group | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Average. | Total. |
|---|---|---|---|---|---|---|---|---|---|
| Kind of wood | Soft Maple | Hard Maple | Hard Maple | Red Oak | Red Oak | Red Oak | Red Oak | ..... | ..... |
| Condition | Dry | Half Dry | Green | Very Green | Half Dry | Dry | Old | ..... | ..... |
| No. ties in retort | 10 | 80 | 10 | 10 | 100 | 280 | 10 | ..... | 500 |
| No. ties run per month | 800 | 6,400 | 800 | 800 | 8,000 | 22,400 | 800 | ..... | 40,000 |
| **UNTREATED.** | | | | | | | | | |
| Cost of untreated tie in track | $.65 | $.65 | $.65 | $.65 | $.65 | $.65 | $.65 | $.65 | ..... |
| Assumed removal of ties from track by years. | Yrs. Ties. | Yrs. Ties. | Yrs. Ties. | Yrs. Ties. | Yrs. Ties. | Yrs. Ties. | Yrs. Ties. | ..... | ..... |
| | .. ..... | .. ..... | .. ..... | .. ..... | .. ..... | 4 200 | .. ..... | ..... | ..... |
| | .. ..... | .. ..... | .. ..... | .. ..... | 4 500 | 5 2,000 | .. ..... | ..... | ..... |
| | 2 100 | 3 1,500 | 2 250 | 4 250 | 5 1,000 | 6 4,150 | .. ..... | ..... | ..... |
| | 3 600 | 4 3,400 | 3 300 | 5 300 | 6 5,000 | 7 9,700 | 6 250 | ..... | ..... |
| | 4 100 | 5 1,500 | 4 250 | 6 250 | 7 1,000 | 8 4,150 | 7 300 | ..... | ..... |
| | .. ..... | .. ..... | .. ..... | .. ..... | 8 500 | 9 2,000 | 8 250 | ..... | ..... |
| | .. ..... | .. ..... | .. ..... | .. ..... | .. ..... | 10 200 | .. ..... | ..... | ..... |
| Tie years | 2,400 | 25,600 | 2,400 | 4,000 | 48,000 | 156,800 | 5,600 | ..... | 244,800 |
| Average life—Years | 3 | 4 | 3 | 5 | 6 | 7 | 7 | 6.12* | ..... |
| Annual charges on ties removed each year. | Yrs. Dollars. | Yrs. Dollars. | Yrs. Dollars. | Yrs. Dollars. | Yrs. Dollars. | Yrs. Dollars. | Yrs. Dollars. | ..... | ..... |
| | .. ..... | .. ..... | .. ..... | .. ..... | .. ..... | 4 36.64 | .. ..... | ..... | ..... |
| | .. ..... | .. ..... | .. ..... | .. ..... | 4 91.60 | 5 300.00 | .. ..... | ..... | ..... |
| | 2 34.97 | 3 358.02 | 2 87.42 | 4 45.80 | 5 150.00 | 6 589.26 | 6 32.25 | ..... | ..... |
| | 3 173.21 | 4 622.88 | 3 71.60 | 5 45.00 | 6 610.50 | 7 1,088.34 | 7 33.66 | ..... | ..... |
| | 4 18.32 | 5 225.00 | 4 45.80 | 6 32.25 | 7 112.20 | 8 417.49 | 8 25.15 | ..... | ..... |
| | .. ..... | .. ..... | .. ..... | .. ..... | 8 50.30 | 9 182.80 | .. ..... | ..... | ..... |
| | .. ..... | .. ..... | .. ..... | .. ..... | .. ..... | 10 16.82 | .. ..... | ..... | ..... |
| Total annual charge—Dollars | 226.50 | 1,205.90 | 204.82 | 123.05 | 1,014.60 | 2,631.35 | 91.06 | ..... | 5,497.28 |
| Annual charge per tie—Cents | 28.3 | 18.8 | 25.6 | 15.38 | 12.68 | 11.74 | ..... | {**13.74 ***12.59} | ..... |
| **TREATED.** | | | | | | | | | |
| Lbs. creosote absorbed per tie | 70 | 35 | 18 | 12 | 22 | 30 | 40 | ..... | ..... |
| Cost of treatment per tie, 5 cts., plus creosote—Cents | 68 | 36.5 | 21.2 | 15.8 | 24.8 | 32 | 41 | ..... | ..... |
| Cost of treated tie in track | $1.33 | $1.015 | $.862 | $.808 | $.898 | $.97 | $1.06 | $.966† | ..... |
| Assumed removal of ties from track by years. | Yrs. Ties. | Yrs. Ties. | Yrs. Ties. | Yrs. Ties. | Yrs. Ties. | Yrs. Ties. | Yrs. Ties. | ..... | ..... |
| | 6 250 | 10 450 | 4 250 | 4 250 | 10 800 | 13 900 | .. ..... | ..... | ..... |
| | .. ..... | 11 750 | .. ..... | .. ..... | 11 1,500 | 14 3,000 | .. ..... | ..... | ..... |
| | 7 300 | 12 1,000 | 5 300 | 5 300 | 12 2,000 | 15 5,000 | 17 250 | ..... | ..... |
| | 8 250 | 13 1,200 | 6 250 | 6 250 | 13 1,700 | 16 6,000 | 18 300 | ..... | ..... |
| | .. ..... | 14 1,500 | .. ..... | .. ..... | 14 1,500 | 17 5,000 | 19 250 | ..... | ..... |
| | .. ..... | 15 1,000 | .. ..... | .. ..... | 15 500 | 18 2,000 | .. ..... | ..... | ..... |
| | .. ..... | 16 500 | .. ..... | .. ..... | .. ..... | 19 500 | .. ..... | ..... | ..... |
| Tie years | 5,600 | 84,350 | 4,000 | 4,000 | 99,120 | 355,200 | 14,400 | ..... | 566,670 |
| Average life—Years | 7 | 13.18 | 5 | 5 | 12.39 | 15.86 | 18 | 14.18* | ..... |
| Annual charges on ties removed each year. | Yrs. Dollars. | Yrs. Dollars. | Yrs. Dollars. | Yrs. Dollars. | Yrs. Dollars. | Yrs. Dollars. | Yrs. Dollars. | ..... | ..... |
| | .. ..... | 10 50.13 | .. ..... | .. ..... | .. ..... | 13 92.79 | .. ..... | ..... | ..... |
| | .. ..... | 11 91.50 | .. ..... | .. ..... | 10 93.04 | 14 294.00 | .. ..... | ..... | ..... |
| | 6 65.50 | 12 113.10 | 4 62.00 | 4 56.95 | 11 161.85 | 15 468.00 | 17 23.57 | ..... | ..... |
| | 7 68.88 | 13 129.60 | 5 60.27 | 5 55.95 | 12 201.20 | 16 528.00 | 18 27.15 | ..... | ..... |
| | 8 51.45 | 14 153.75 | 6 42.85 | 6 39.80 | 13 162.35 | 17 426.50 | 19 22.00 | ..... | ..... |
| | .. ..... | 15 98.10 | .. ..... | .. ..... | 14 136.05 | 18 165.80 | .. ..... | ..... | ..... |
| | .. ..... | 16 46.75 | .. ..... | .. ..... | 15 43.40 | 19 40.25 | .. ..... | ..... | ..... |
| Total annual charge | $185.83 | $682.93 | $165.12 | $152.70 | $797.89 | $2,015.34 | $72.72 | ..... | $4,072.53 |
| Annual charge per tie—Cents | 23.23 | 10.67 | 20.64 | 19.08 | 9.97 | 9.00 | 9.09 | {10.18** 9.67***} | ..... |

*Average from total tie years. **Average obtained from calculating charges on each class separately.
†Figured on total number of ties treated. ***Average obtained by using average life.

CANTON-HANKOW RAILWAY, CHINA.—The Kwangtung Mercantile Administration of the Yuet-Han Railway Company, a corporation of merchants, was organized with the assistance of the provincial government about six years ago to take over the Canton-Hankow Railway as originally projected. Its capital was $19,500,000. It was formed to construct that portion of the Canton-Hankow system which lies in the province of Kwangtung, the portions of this system in Hupeh province south of the Yangtze and in Hunan province being in the control of provincial companies organized to construct the lines therein. The shares in the Kwangtung company were placed at $2.50 each, and it was agreed, and has materially been adhered to, that only stockholders would be employed in building and operating the line.

## STUDYING THE SECTION FOREMAN.*

BY E. R. LEWIS,
Assistant to the General Manager, Duluth, South Shore, Bay City & Atlantic, Duluth, Minn.

The decision of men to enter and continue in railway service depends on many conditions. Other conditions being equal, a laborer will naturally market his labor where he will receive the highest pay. These other conditions of railway service must be such as to outweigh the percentage by which manufacturers overbid the railways in the wage scale. Generally speaking, the railways of this country never have, and probably never can, pay as high wages for labor as do industrial concerns. In the good old days of transcontinental railway construction there was little competition among employers for the services of the laborer, or the foreman, but these conditions have vastly altered. During each season of commercial activity, labor is now invariably at a premium. Manufacturers and others offer high wages, short hours and many other inducements which draw laborers away from the railways. It is from the ranks of the young married men that we must look for the foremen of the future. An increase of only one cent a day will induce an unmarried man to change jobs.

The track laborer becomes a foreman through successive promotions from common laborer to section laborer, best man and assistant foreman. Track maintenance is a trade, necessitating preparation by the apprentice, the same as is required of

*Received in the Contest on The Section Foreman Problem, which closed March 25, 1912.

any other class of railway work. The common laborer must serve at least twelve months before he is competent to do the work of a section laborer. The section laborer cannot hope to become best man inside of a year, and a similar term is a minimum apprenticeship for the best man and the assistant foreman. Few foremen attain that position in less than five years.

The responsibilities of the foreman are heavier and more continuous than those of the engineman or trainman. The foreman must be able not only to perform more physical labor than any man in his gang and do it more steadily, but he is required to send to headquarters some 20 different kinds of reports each month, to the total average number of thirty-five, beside telegrams concerning any unusual happenings on his territory. This clerical work begins each day when his track labor ends.

He is timekeeper for himself and his men. He is responsible for the safety of the tracks, switches, waterways, crossings and in many cases for switch and semaphore lamps on his section. He is responsible for track repairs and for emergency repairs to telegraph lines, bridges and culverts, signals and interlocking; for the safe conduct of his men and car over main tracks without any safeguard in the way of train orders. He must know the time of arrival and departure of all regular trains and whether or not they are running late, timing his work accordingly. He must be as familiar with the flagging rules as are the trainmen and enginemen. He must effectively police the campany's property against all acts of trespass and vandalism without any real police power. He is responsible for the proper care and appearance of the permanent way and the fences enclosing it. He must deal as the company's representative with adjacent property owners. He has more than a hundred other duties to be found in detail in the rule books. It is not surprising then that employers of section men and foremen are often perplexed in the attempt to select foremen capable of filling all these diversified requirements.

But there are ways of getting and keeping good men and of compensating them in addition to the money consideration. Exact justice is a prime factor in dealing with men. Men prefer to labor for small pay and exact justice, rather than for liberal pay and scant consideration. More trouble is averted by wise handling of men than by increase in wages. Men must be studied, taught and led, not driven. To lead a man to make a suggestion of a way to accomplish a certain result which is in accordance with the employer's wish, is vastly better than to give that man a peremptory order to do the same thing. If he suggests it, he is in favor of it; if you order it, he most naturally opposes it, at least in his own mind. An entire organization may be quietly and sytematically awakened by personal suggestion till the efficiency is doubled.

The foreman naturally looks to his superior officer for that friendly co-operation which duty well done deserves. It is of advantage for roadmasters or other employers of section labor to be with men and foremen during examination for vision and hearing as well as when they are called as witnesses in lawsuits. A word of encouragement at such times gives confidence to the employee and relieves the feeling of fear of the antagonism which he feels sure lurks somewhere within the recesses of the examiner's car or behind the lawyer's desk.

Foremen and laborers must be kept at their own work exclusively in order to accomplish best that which is expected of them. There is no labor on a railway so expensive as section labor off the section doing odd jobs. Every hour's labor taken from track work is lost forever. It must be done daily, hourly, steadily, to get the requisite benefit within the season's limits.

Colonization is a strong factor in the retention of men. The railway company which builds its own cottages, each within its own dooryard; which keeps its laborers and foremen together in their own little community in each town; which charges nominal rents and keeps its houses in systematic good repair, is pretty sure to have an efficient and contented force. Instead of being scattered and difficult of mobilization in case of emergency, they are all where they may be called by one telephone message.

The maintenance of a certain fixed number of section men and foremen the year round at a constant rate of pay is of immense advantage to any road. If section men are hired in spring and discharged before winter sets in, while those who remain during the winter months receive reduced wages, the results cannot but be poor as compared with steady pay and full gangs the year round. Moreover, the reduction of men and wages is false economy. The money "saved" is spent many times over during the winter for the inferior service rendered by temporary laborers hired on the spur of the moment when some blizzard threatens to tie up traffic. Out at knees and elbows, poorly clad and worse shod, unused to exposure and with no further interest than the coming of the friendly darkness which insures the receipt of a time check, these men shirk, and make more trouble than their work is worth. One good steady laborer, acquainted with the section and the work required, is worth six green hands, whom the section foreman must continually watch to keep them from being run down by cars. It is even better to reduce the wages to make a flat all-year rate than to have one rate for summer and another for winter.

The supply of plenty of good tools and material goes far toward holding foremen. Every division should have its own blacksmiths and its own repair shops, where tools and materials may be promptly and properly overhauled and repaired or altered.

A very potent factor in the retention of section foremen is the wise arrangement of their work. A distribution of men to obtain double patrol duty with little expense consists in having the assistant foreman live at the opposite end of the section from the foreman. The assistant walks from his home till he meets the gang in the morning. He walks home from any place on the section where work is finished at night. He inspects the track each way and reports its condition to the foreman after each trip.

Sharp differentiation should be observed between the different grades of service, and several grades should be maintained in order that each man may have something to strive for which is not too far beyond his early reach. Thus each man's interest is held and each succeeding year holds its promise of promotion for merit. The disciplining of foremen should receive the most serious consideration. Observation of the seniority is of advantage to the disciplinarian. The older man should have preference over the younger in service.

The pass privilege, wisely administered, in progressive steps, is much appreciated by all employees and rarely abused. A laborer should be required to work continuously for, say, six to twelve months, before being granted transportation once a year over the home territory. Later he may be considered eligible for system passes, then passes over foreign roads and finally for passes for the members of his family, if regulations permit.

It is necessary that increases in expenditures for wages which are incompatible with the financial resources and the economic necessities of the property, should be prevented. However, an employing officer with $1,500 to spend for labor and authority to pay all laborers $1.50 may find it impossible to hire 1,000 men at that rate on account of varying conditions in the labor markets. At the same time, he might, if allowed to vary his wage scale, get 1,050 laborers for $1,500 by paying 800 men $1.25 each in country districts and 250 men $2 each for city work. Could not any employing officer save his company money if given an annual or monthly lump sum estimated to cover the total expenditures for labor, with the partial privilege of spending it to the best advantage? The pension system is a boon to the aged and a factor in retention of the employee.

There is little in the idea that the railway laborer is dete-

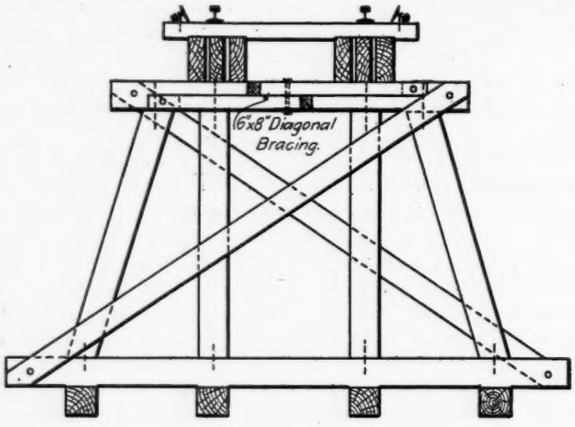
riorating. Why should not the European or the Asiatic develop into a first-class foreman under proper training? When he learns our language, when he understands American ways and knows the rules of the game, the foreigner, with his old-world training, often outstrips his American competitor. A certain percentage of the foreign laborers is worth cultivation and education. The fault lies largely with the unobserving or impatient employer.

## DIAGONAL OR HORIZONTAL CROSS-BRACES FOR TRESTLE BRIDGES.

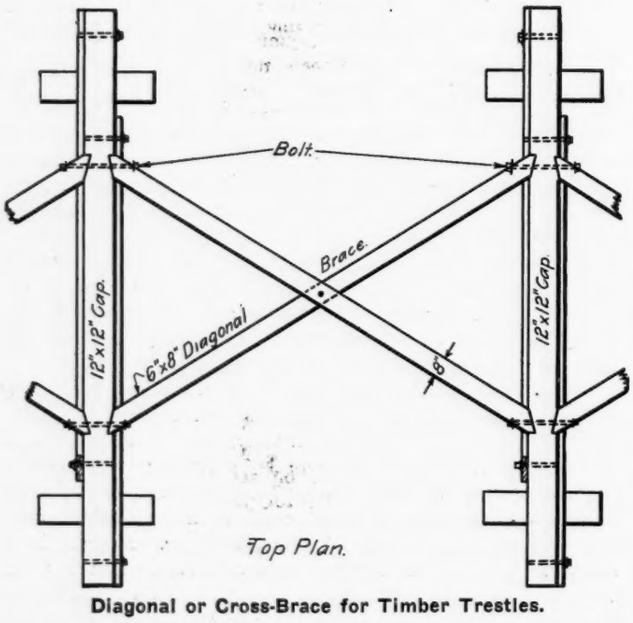
BY R. P. BLACK,

Engineer Maintenance of Way, Kanawha & Michigan, Charleston, W. Va.

In the maintenance of wooden trestle bridges, the greatest trouble is to keep the bridge and track in good alinement. This is successfully accomplished with single deck trestle bridges, by putting on diagonal braces erected horizontally between the caps




Elevation of Bent.




**Diagonal or Cross-Brace for Timber Trestles.**

of each bent, beginning at the end cap and continuing to the other end.

These diagonal or cross horizontal braces are shown on the accompanying plan of a trestle bridge. A 6 in. x 8 in. piece of timber is used, either of white oak or yellow pine of proper length to reach diagonally across from cap to cap, one brace being above the other. The caps are dapped or notched to receive the end of the brace, and in addition to this a lag screw or bolt is put in to securely hold the brace to the cap, and to further stiffen the brace. Each pair of braces are bolted together where they cross at the center. The stringers are securely fastened by drift bolts to the caps, and the ties are also fastened by lag screws to the stringers. Where it is necessary to skew the bents on account of the angle of the road or creek over which the bridge is built, combined with an alinement of sharp curvature, this system of bracing has been found to be very successful in keeping the track in good alinement. All that is necessary in addition is to place good cross braces vertically across each bent. One advantage of this system of bracing is that the space between bents is left entirely free from obstructions, thereby lessening the trouble from the lodging of drift.

It will be noted that practically this same plan is followed out in the bracing and stiffening up of floor beams and stringers of steel girder or truss bridges.

## COST OF ROCK BALLAST.

The following figures of the actual cost of putting stone ballast under track are of interest to track men as illustrating what can be done in this work with a good organization, where attention has been given to a careful planning of details. This work was done on a heavy traffic line where it was necessary to pass a large number of trains daily, the total raise amounting to about 10 in.

| | |
|---|---|
| Number of yards | 58,883 |
| Digging out, unloading, putting under and dressing up | $7,763.40 |
| Labor cost, per yard | $0.1318 |
| Stone, 58,883 cu. yds | $30,619.16 |
| Digging out, unloading, putting under and dressing up | 7,763.40 |
| Engine service | 2,385.00 |
| Stone inspection | 222.00 |
| Total | $40,989.56 |
| Cost per yard | $0.696 |
| Putting in 9,310 ties, putting on 8,400 tieplates, gaging | $893.76 |
| Cost per tie | $0.096 |

## THE SECTION FOREMEN PROBLEM*

BY B. M. HUDSON,

Trinity & Brazos Valley, Teague, Tex.

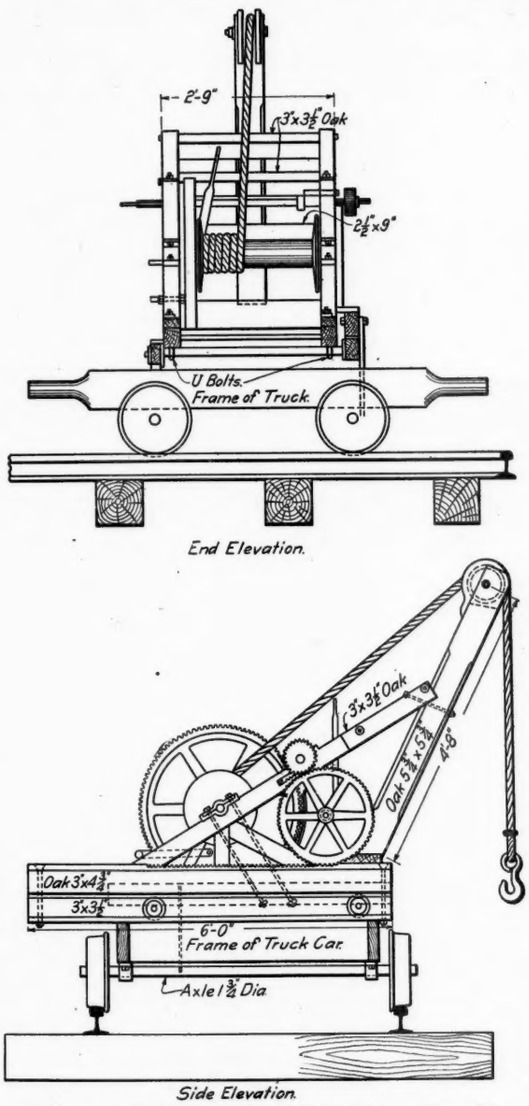
In the past section foremen were drawn largely from construction forces, and as construction work decreased good section foremen became more scarce. In the future, all foremen should be promoted from track laborers, and to get better foremen, track labor will first have to be improved. Salaries must be increased, living conditions improved; steady positions created for a stated number of men, and the officers must keep in closer touch with the men. An increase in salary alone will not do, as is shown by the history of organized labor. Salaries of organized bodies have been increased from time to time and efficiency, if anything, is going back. Very few roads are furnishing desirable living quarters and keeping them up. The present practice of cutting section labor every time business drops off drives track labor away from the roads, for only making a bare living they must look for new employment as soon as they are laid off, and finding other employment they never return to the railway. Again foreigners have to be imported, and to fit them for promotion is slow and expensive; yet in making promotions nationality should not be considered, efficiency alone should govern. Officers can best get in touch with their men by the appointment of a board of efficiency with as many roadmasters as possible on it, for track labor being the weakest place in the machine it will require the most attention. Efficiency can be improved to justify an increase in salaries and money spent on improvement of living conditions.

*Received in the Contest on The Section Foreman Problem, which closed March 25, 1912.

## A MOUNTED CRAB FOR HANDLING BRIDGE MATERIAL*

BY S. C. TANNER,
Master Carpenter, Baltimore & Ohio, Baltimore, Md.

The mounted hoist or crab greatly reduces labor, and will more than double the amount of bridge timber handled in a day. In renewing bridges or parts of same, three men with this hoist can handle any timber commonly used, picking it up on shore and delivering it on the bridge. The largest timber I have handled in this way was a piece of 12 in. x 12 in. x 57 ft. long, white oak, used for a batter post in a framed trestle. This stick




**A Mounted Crab for Handling Bridge Material.**

of timber was picked up in the middle with a double purchase on the hoist and pushed out to place. After the truck was chained to the track, the timber was slacked into place as easy as if it were handled with a steam crane.

One will note from the plan that the hoist is so arranged that it will move forward, or backward across the railway track on a truck specially designed with top and bottom rails made fast to the truck. The car is also arranged with gearing, so that when the load has been hoisted to clear the bridge, the transverse gear is thrown into the hoist gear by the movement of a lever. One turn of the hoist gear moves the hoist and its load across the truck, balancing the load and preventing it from turning over while being lowered into place. The back part of the truck should be chained or clamped to the track, after which, by slacking the hoist one turn, the transverse gear moves the hoist and its load forward until the boom reaches out over the end of the ties, at which time the transverse gear can be thrown out of gear and the timber slacked into place easily and without danger.

I have handled heavy iron bridge work, also stone work, with this hoist, and find that three men can do more work of this kind in a day with it than eight men can do by hand, and with less labor.

*Received in the contest on Bridge Kinks, which closed June 25, 1912.

## EFFICIENT USE OF THE EXTRA GANG.*

BY F. M. PATTERSON,
Chicago, Burlington & Quincy, Chicago, Ill.

To the roadmaster who in addition to his routine maintenance work must take care of extensive renewals of rail and ballast, the extra gang is at once a necessity and a curse, for he must deal with a very inferior class of labor in his efforts to use the extra gang to the best advantage.

In organizing gangs for the season's work care should be taken to see that the same gang is kept at the same kind of work and foremen should be selected, not only for their ability to handle men, but for their fitness for the work the gang is to do. The size of the gang can be regulated to give a maximum of efficiency, and there is thereby gained a great saving in tools.

The selection of gangs as to nationality for various kinds of work must be guided by the experience of the roadmaster. It would be interesting and instructive to know just what kind of work the various nationalities are best fitted for, but the roadmaster's knowledge is often limited to two or three classes. For the work involving the higher order of intelligence the "hobo" laborer is perhaps the best if the foreman in charge can handle it, and about the worst if he cannot.

The efficiency of a gang depends to a very large extent on its foreman. Generally it will be found best to select as foreman some section foreman who is known to possess the proper qualifications, and to give his section in the meantime to some young man who has shown promise of ability as a section foreman. This will furnish an incentive to the men in the ranks as well as supply for the extra gang a foreman in whom the roadmaster has confidence.

Where the gang is large it will be economy to have enough assistant foremen to see that the men keep at work, and the plan of having each gang perform only one kind of labor during the season will enable one to organize the gang into squads, thereby familiarizing the men with the work and employing the assistant foremen to the best advantage. Anyone who has watched a large gang at work under a single man will soon realize that the time lost in "soldiering" would pay for several assistants. The assistant foremen should be young, vigorous and intelligent men who have shown aptitude for track work. In this way the extra gang can be used as a training school for prospective section foremen.

In deciding on the track work to be done by the extra gang it should be made a rule never to use it where the section gang can do the work, for it is safe to assert that the work is never so thoroughly done by the extra gang. This is natural, for the ability of the gang is too often gaged by the quantity of its output, rather than its quality and the foreman is striving to cover ground as rapidly as possible, usually at the expense of thoroughness. This tendency is most strongly marked in ballasting, and slackness in tamping often enables a gang to show big records, leaving a lot of work behind them for the section forces. On the other hand, work that does not pertain strictly to the track, such as rebuilding fence, mowing right of way, ditching

*Received in the contest on The Organization of the Extra Gang, which closed April 25, 1912.

and similar odd jobs usually can be done more economically by extra gangs, if there is enough of such work to keep the gangs busy.

The program for the season's campaign should be so planned that the work will be done in the proper order, and so as not to interfere with, or undo, what has been done by another gang. Work should be started as early as possible in the spring with the idea of having most of it out of the way before the intense heat of the summer, thus giving the section forces plenty of time to put the track in first class condition for the winter. The most efficient work can be done in the comparatively cool weather before midsummer, and in many parts of the country the demand for harvest labor, with its relatively high pay, renders it impossible to keep gangs recruited to their proper size during the harvesting season.

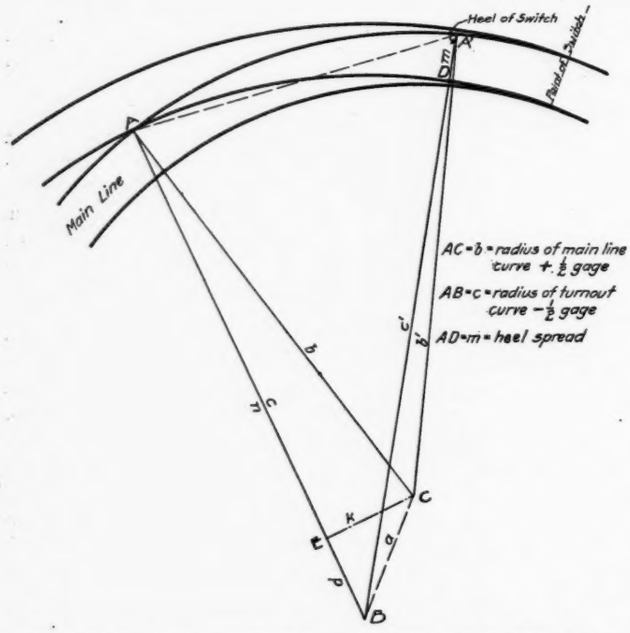
The boarding cars furnished for the men should be comfortable and capable of sheltering their occupants from cold and wet, for men engaged in hard labor should not have their strength impaired by exposure during their hours for rest. Proper sanitary conditions must be rigidly enforced and every facility furnished for their maintenance.

## A PROBLEM IN TURNOUTS.

BY W. J. FAUTH,

Assistant Engineer, Chicago, Burlington & Quincy, Chicago, Ill.

The solution of an interesting problem which arose in making plans for special frog and switch work is here presented. A one to 11 turnout with a special spring rail frog was to be placed on the outside of an 11 deg. 30 min. curve. The radius of main track, frog angle, switch angle, gage of track and heel spread of switch, were given and the problem was to determine the radius of the turnout, and the chord A A'.


Heel of Switch
Point of Switch
Main Line
AC = b = radius of main line curve + ½ gage
AB = c = radius of turnout curve − ½ gage
AD = m = heel spread

**Frog Problem for Turnout on Outside of 11 Deg., 30 Min. Curve.**

The stock rail was to be placed on the outside of the turnout and standard switch points used, to be curved in the field to make an unbroken curve on the main line. In order to do this and maintain the standard spread at the heel of the switch the stock rail had to be curved to the same radius as the main track up to the heel of switch. The curves being equal the angle between the tangents to the curves at the heel of switch was equal to the switch angle. The formula derived below is applicable, however, whether this is equal to the switch angle or not.

In the figure the side C B is common to triangles A C B and A′ C B.

In the triangle A C B, angle B A C, and side A C are known. Dividing this triangle into right triangles we find that

$$k = b \sin. B A C$$
$$n = b \cos. A C$$
$$\text{and } p = c - n = c - b \cos. B A C$$
$$a^2 = p^2 + k^2$$

Therefore

$$a^2 = (c - b \cos. B A C)^2 + (b \sin. B A C)^2$$
$$= c^2 - 2 c b \cos. B A C + (b \cos. B A C)^2 + (b \sin. B A C)^2$$
$$= c\,(c - 2 b \cos. B A C) + b^2 (\cos.^2 B A C + \sin.^2 B A C)$$

$\sin.^2 B A C + \cos.^2 B A C = 1$

Therefore

$$a^2 = c\,(c - 2 b \cos. B A C) + b^2$$
$$= c^2 + b^2 - 2 bc \cos. B A C$$

In the triangle A′ B C, by the same reasoning we have,

$$a^2 = c'^2 + b'^2 - 2 b'c' \cos. B A' C$$

The side "a" being common to both triangles we have,

$$c^2 + b^2 - 2 bc \cos. B A C = c'^2 + b'^2 - 2 b'c' \cos. B A' C$$

Now, $m$ = gage − heel spread at A′ = A′ D

and, $b = b'$

$$c' = c + m$$

Substituting,

$$c^2 + b^2 - 2 bc \cos. B A C = (c + m)^2 + b^2 - 2 b \cos. B A' C\,(c + m)$$

Or

$$-2 bc \cos. B A C = 2 cm + m^2 - 2 bc \cos. B A' C - 2 mb \cos. B A' C$$

Transposing,

$$-2 bc \cos. B A C + 2 bc \cos. B A' C - 2 cm = m^2 - 2 mb \cos. B A' C$$

$$c = \frac{m^2 - 2 mb \cos. B A' C}{2\,[b\,(\cos. BA'C - \cos. BAC) - m]} = \frac{2 mb \cos. A' - m^2}{2\,[m - b\,(\cos. BA'C - \cos. BAC)]}$$

To find the chord A A′:

In the triangle A C B, angle B A C and sides b and c being known, find angle C B A. In the triangle A′ C B, by the same process, find angle C B A′. The difference between these angles C B A and C B A′ is A B A′, the central angle of the long radius or turnout curve.

The central angle A C A′ of the short radius curve is equal to A B A′ + B A C − B A′ C

The chord can then be found with the regular formula

$$C = 2 R \sin. \tfrac{1}{2} \text{ triangle.}$$

## EMPLOYING AN ASSISTANT FOREMAN.*

BY EDGAR W. WALSH,

Roadmaster, Company N. W., Ironwood, Mich.

The wages paid for section labor are too low to induce intelligent young men to take up this occupation for a life work. An experienced section laborer receives the same rate of pay as the inexperienced man, and when he has served his apprenticeship his wages as a foreman are about the same as a laborer without responsibility at some other occupation.

The Union Pacific has adopted a system of education for its employees which is a very good step towards qualifying section men for more responsible positions. This is available not only among the native employees, but foreign laborers as well. The Chicago & North Western has practiced a plan of appointing a limited number of student foremen on each division, which plan has provided a sufficient number of foremen in the past. However, as native labor is getting scarce and foreign labor is being installed more and more, it will be necessary to adopt some plan of educating foreign laborers to take positions of responsibility.

Each section should have at least one experienced and competent English-speaking man, all the year round, who can look after the work of flag trains, as a section foreman cannot leave his crew to look after other parts of his track, or to flag a train when the men do not know what to do, or how to do their work. Such a man as this earns more for the company than the inexperienced man, and should be taken care of in a way to retain him in the service, as these are the men we must look to for our future supply of foremen.

YACUBIA TO SANTA CRUZ RAILWAY, BOLIVIA.—An official survey of this line has been commenced.

*Received in the Contest on The Section Foreman Problem, which closed March 25, 1912.

# General News Section.

The Senate has voted to put off until December the hearing of the impeachment charges against Judge Archbald.

The Agents' Association of the Southern Railway held its annual meeting at Chattanooga, Tenn., August 6, 7 and 8. The president of the association is T. L. Hill, of Birmingham.

The Industrial Accident Commission, a body established by the legislature of Pennsylvania, has published a draft of a workmen's compensation act which has been drawn for presentation to the lawmakers of that state.

The government has begun suit in the federal court at Philadelphia against the Central of New Jersey on charges of violating the hours of service law in requiring telegraphers to work 12 hour periods at Easton, Pa.

Committees devoted to the starting and prosecution of a "Safety First" campaign have been formed on the Cincinnati, Hamilton & Dayton. The business will be managed in the same way as on the lines of the parent company, the Baltimore & Ohio.

The shops of the Gulf, Colorado & Santa Fe, at Cleburne, Tex., were badly damaged by fire August 12; loss, $250,000. The reports say that an oil tank was set afire by a lighted candle in the hands of one of the workmen. This workman was fatally injured.

The Hudson & Manhattan has been granted an extension of time by the New York Public Service Commission, First district, to April 28, 1914, in which to begin construction of the proposed extension from Thirty-third street and Sixth avenue, New York City, to the Grand Central station.

A bill has been introduced in Congress (H. R. 26,135) to require all road locomotives to be equipped with high power headlights. The bill is very brief. It was introduced by Representative Pickett, of Iowa, and there is a clause providing that it shall go into effect six months after its passage.

According to a press despatch from Binghamton, William H. Schroeder, the engineman of train No. 11, which was in the collision at Corning, N. Y., July 4, has sued the proprietors of the *Literary Digest* for $50,000 damages because of a statement printed in that paper to the effect that Schroeder was responsible for the wreck.

The Missouri Pacific announces that the hospitals throughout the company's system have been turned over to the management of a board of nine managers, to be controlled by the employees. The company has large hospitals at St. Louis, Kansas City and Little Rock, and some facilities at 30 other points. The chief surgeon of the road, Dr. Paul F. Vasterling, is to be chairman of the board of managers.

The Louisville & Nashville has ordered the Western Union Telegraph Company to remove from the railway company's right of way all its poles and wires. This is the outcome of negotiations and litigation begun many months since. The officers of the telegraph company say that they are waiting for a decision from the court. The present contract between the railway and the telegraph company expires August 17.

The Chicago Union Transfer Railway has been sold to the Chicago & Western Indiana. This sale consummates the plan providing for the joint ownership and operation by fourteen of the principal Chicago roads of the Belt Railway of Chicago. The Chicago & Western Indiana will probably increase the capital of the Belt Railway and lease to it the property it has just acquired, when equal shares of its stock will be taken by the roads who are not already joint owners of the Belt line. The details of this plan were fully outlined in the *Railway Age Gazette* of March 22, page 693.

With the aim of securing an appropriation from Congress for an immigrant station at Chicago, the directors of the Illinois Central have addressed the House committee on appropriations at Washington. The directors, urging the "necessity for a more adequate government surveillance of our immigrant traffic, particularly at the interior distributing points, respectfully request that favorable consideration be given by the committee on appropriations of the House of Representatives to House roll No. 21,220, introduced by Congressman Sabath of Illinois, entitled: 'A Bill to Extend the Power of the Commissioner of General Immigration, Subject to the Approval of the Secretary of Commerce and Labor.' Large numbers of immigrants arrive at and depart from the Illinois Central station in Chicago each year and the information which we have obtained with reference to the handling of these immigrants prompts us to make this recommendation."

Max H. C. Brombacher, an efficiency engineer of New York City, who for the past six or seven months has been on a tour of investigation of the railway shops of England and the continent, having special reference to shop management, equipment and the cost of maintaining cars and locomotives, has returned to this country and is preparing a report for the Interstate Commerce Commission. The large amount of statistical data which was collected and which must be tabulated will probably delay the completion of the report until near the end of the year. Mr. Brombacher visited the principal shops and headquarters of the railways in England, Switzerland, France, Grand Duchies of Baden and Hessen-Darmstadt and the kingdoms of Bavaria, Prussia, Saxony, Wurtembergh and the Austrian Empire and was given every opportunity to make the observations he desired. He reports that incidentally he had an opportunity of visiting a number of private shops and that the condition of the equipment was such that it appears that there would be a very good market abroad for American machine tools, which are far superior to those that he noticed in operation.

The Panama Canal bill was passed in the Senate on August 9 by a vote of 47 to 15 after being amended so as to provide for the remission of tolls to American vessels engaged both in coastwise and foreign traffic; to prohibit vessels owned by railways from using the canal; and to admit to American registry American owned foreign-built ships not in coastwise trade. The bill contains a modification of the House provision divesting the railways of their steamship lines in an amendment, offered by Senator Bourne, placing this question under the administration of the Interstate Commerce Commission. On the 14th, committees of the Senate and the House in conference agreed upon a number of modifications. Only vessels engaged in coastwise trade may go through the canal free. Section 11, forbidding the passage through the canal of vessels owned by American railways, was altered so as to make this prohibition apply to the interest of railways in any common carrier by water operated through the Panama Canal *or elsewhere,* with which the lines of the railway compete. The provision seems to forbid a railway to have an interest in a competing boat line anywhere, as, for example, between New York and Fall River, or Boston; but the Interstate Commerce Commission is given authority to determine questions of fact as to competition, and apparently may authorize the continuance of existing relations if it can be held that these are in the interest of the public and "do not exclude competition."

### Massacre of a Trainload of Passengers in Mexico.

Rebels fighting against the government of Mexico derailed a passenger train near Cuautla, August 11, and when the train came to a stop rushed upon the cars and killed 35 soldiers and 25 or more passengers.

### A Double-Deck Street Car.

The New York Railways Company is trying a double-deck street car which has just been made for it, from designs by General Manager Frank Hedley, by the J. G. Brill Company. The car is 44 ft. 10 in long and 8 ft. 3 in. wide. The upper deck is a little shorter than the lower one. Teh entrance is at the middle of the side of the car, as in the "stepless" car lately introduced on the lines of this company and of which 150 (single deck) have been ordered. As in the original stepless car, the lower floor of the new car, between the trucks, is only about 10 in. above the pavement. The stairways to the upper deck are inside the car at each end. The upper seats are arranged in two longitudinal rows, back to back, and the ceiling of the lower story is higher in the center than at the sides.

The car will seat 88 passengers and has a maximum capacity of 171. The weight of the car per seated passenger is said to be less than 500 lbs. The head room in the lower story is for the most part 7 ft. 6 in., and in the upper story 6 ft. 1 in. The car has an air brake, with provision for increasing the braking power in proportion to the weight of the load in the car. The doors are opened and closed by compressed air, controlled by a foot lever fixed next the seat occupied by the conductor, who sits opposite the entrance of the car, taking the fares of all passengers as they enter.

### Safety Committees on the Lehigh Valley.

Safety committees are to be established on the Lehigh Valley; and a prize is to be awarded in each department, on each division, every year, to the employee who makes the best suggestion toward increased safety of operation. The prize will consist of a month's vacation with pay. The recipient of the prize will also receive an "honor button," to be retained by him as long as he remains on the honor roll. The members of the general safety committee are the general manager, the superintendent of transportation, the superintendent of motive power, the maintenance of way engineer, the claims attorney, and whatever other officer or employee the general manager may appoint. The membership of the division committees includes not only officers, but in each case an engineman, a fireman, a conductor, a trainman, a switchman, an agent and a section foreman.

### Safety Committees on Southern Pacific.

Safety committees are being organized on the Southern Pacific. The main safety committee will be composed of division superintendents, and on each division there will be a safety committee comprising the superintendent, members of his staff from various departments, a conductor, engineer, brakeman, fireman, yardman, trackman, signalman, bridge and building man and shop man, and each of these employees will be the chairman of another distinct safety committee. Suggestions that will tend to prevent accidents in all branches of the railway service will be entertained by the committees of employees between monthly meetings, later brought up at the division committee meeting, and again at the general safety committee meeting. The members of each committee will wear artistic buttons.

### Safety First; "Extension Work."

At the opening of the safety campaign on the Cincinnati, Hamilton & Dayton, at Indianapolis, Mr. Egan, of the Baltimore & Ohio, the principal speaker, emphasized the far-reaching character of the investigations which have been made by the B. & O. safety committee, as follows:

"Domestic trouble is responsible for a multitude of accidents among railway men. An unkind word is spoken in the morning. The husband goes to work with his domestic troubles on his mind. Thinking about his quarrels with his wife, he is apt to walk into places into which he should not walk, or do things he would not do if his mind were clear. The result is many accidents, many injuries, all preventable."

Among the stereopticon views shown by Mr. Egan were pictures of "how a man should part from his family in the morning," and "how he should not," the latter being the picture of a vinegar-faced wife evidently berating her husband.

### Automatic Signal Installations on the Wabash.

The Wabash is now installing automatic block signals through Indiana in accordance with the requirements of the railway commission of that state. At present the signals are being placed to protect the yards at Williamsport to Attica, LaFayette, Delphi, Logansport, Peru, Wabash and Huntington. It is proposed next year to install signals between these places.

There are in the present installation a total of 66 signals, 37.59 miles of road and 41.57 miles of track. Union style "S" lower quadrant signals are used except at interlocking plants where Union style "T" signals are placed on existing posts. The home signals at interlocking plants, of which there are four in this installation, are made semi-automatic with a mechanical calling-on arm. At interlocking plants annunciators are employed, with indicators for the distant signals. Route locking is used at all interlocking plants.

Gravity battery is used on the track circuits; Columbia track batteries are employed to operate the locks, and the signals are operated by Gordon type "AA" primary cells, which are housed in Massey style "E-20" wells. Union Switch & Signal Company's relays are used, and are placed in wooden relay boxes on Massey concrete posts.

The greatest number of signals in one yard is at Peru, where there are 17, beginning at Peru Junction, the end of the double track, and continuing through the crossing of the Chesapeake & Ohio, which is protected by a Union outlying switch lock. The Wabash proposes to install automatic block signals on all of its double track, part of which is now under construction. These installations will be as follows:

| | |
|---|---|
| Delray, Mich., to Milan, Mich. | 33 miles |
| Franklin, Ohio, to Montpelier, Ohio. | 13 miles |
| New Haven, Ind., to Hugo, Ind. | 8 miles |
| Gary, Ind., to Clarke Junction, Ind. | 6 miles |
| St. Line, Ind., to Fairmount, Ill. | 21 miles |
| Tolono, Ill., to Mt. Olive, Ill. | 107 miles |
| Lodge, Ill., to Bement, Ill. | 13 miles |
| 75th St., Chicago, to Orland, Ill. | 15 miles |
| Staunton to Granite City, Ill. | 31 miles |
| Clark, Mo., to Huntsville, Mo. | 18 miles |
| Salisbury, Mo., to Brunswick, Mo. | 18 miles |
| Excelsior Springs Junction to Birmingham, Mo. | 11 miles |
| Total | 294 miles |

Interlocking plants are to be installed as follows:

Gary, Ind., at an end of double track.

Fairmount, Ill., at an end of double track.

Orland, Ill., at an end of double track.

West Decatur Junction, at the junction of the St. Louis & Springfield lines.

Decatur bridge, at a gauntlet over Sangamon river.

Salisbury, Mo., at an end of double track.

Brunswick, Mo., at an end of double track.

Excelsior Springs Junction, Mo., at an end of double track.

### Report on Eastabuchie Derailment.

The Interstate Commerce Commission has issued the report of Inspector H. W. Belnap on the derailment of a northbound passenger train near Eastabuchie (Hattiesburg), Miss., on the New Orleans & North Eastern, May 6, in which six passengers, the engineman, the fireman and one other person were killed, and 56 persons were injured. The inspector's conclusion is that the derailment was caused by uneven track on a soft roadbed. The speed of the train is estimated to have been about 35 miles an hour. The leading truck of the tender ran off the track just before reaching a trestle bridge; and it bunched the ties so that the cars readily knocked out the rails and the fourth and fifth cars, tourist sleepers, knocked down some bents of the trestle and broke through to the ground below, being completely wrecked. It was in these two cars that the six passengers were killed. The line of the road at this place is straight and level. The track was laid with 75 lb. rails and pine ties. The majority of the ties were at least eight years old. In 21 rails south of the point of derailment, the inspector found 24 decayed ties, and in 26 rails north of the bridge, 23 decayed ties. The ballast was of sandy gravel about 12 in. deep. Beneath the track for about 360 ft. south of the trestle, the inspector found the ground soft and wet and the track at this point has required special attention. On April 30 the track was adjusted and several joints were raised; on May 2 the track was again surfaced. The men on the adjacent section and an extra gang had been called to this place a number of times. On one occasion it had been necessary to put cribbing under the track. Slow orders had been issued several times, one of them as recently as April 30, but no such order was in effect on the day of the accident. The trestle bridge was built in 1904. It has been repaired four times and the inspector holds that it was in good condition at the time of the accident. Nothing wrong was found on the locomotive, and the tires and flanges of both engine and tender were in excellent condition.

The two wrecked sleeping cars were built in 1880 and 1886 and were converted from standard to tourist cars in 1906 and 1902, respectively. The inspector's conclusion is as above noted, and in connection with this statement he says that it "is clearly shown" that this track was and for some time had been in bad condition; and at the time of derailment it was being reconstructed. The evidence of this is given only in general terms, as above noted, though the report says that two days *after* the accident the repairers raised a low center, just

south of the point of derailment, about 2 in. The first three cars of the train had steel underframes, and none of these was badly damaged. The engine and tender ran entirely across the trestle, which was about 140 ft. long, before being overturned. The inspector says that the wrecking of the wooden sleeping cars emphasizes the recommendations made last year by the Interstate Commerce Commission that the use of steel cars be made compulsory. The report says that the bridge, though in good condition and well maintained, "was not of sufficient strength to withstand the pressure to which it was subjected"; but it has nothing to say about the design or character of the bridge floor. The statement that the tender truck bunched the ties seems to imply that the ties were not blocked apart; and nothing is said as to the presence or absence of guard timbers or guard rails.

### Derailment at Dorchester, Mass.

In the derailment of a northbound local passenger train on the New York, New Haven & Hartford, at Dorchester (Boston), Mass., August 8, the engineman and fireman were killed and 5 passengers were killed or fatally injured. A man who was a spectator while the wreck was being cleared away dropped dead from heart failure. The train was running at about 35 miles an hour when the engine jumped the track, and after bumping over the ties for about 150 ft. fell over into a swamp at the side of the track and was half buried. The two cars next to the engine, which were day coaches, and in which the fatal injuries occurred, were carried over the engine, the projecting parts of which ripped open the sides of the cars. One of the cars took fire from the engine, but the flames were soon extinguished. Some of the killed and injured passengers were scalded by steam from the engine. The cause of the derailment has not been discovered. The state railway commissioners and some of their inspectors visited the spot and published a statement to the effect that no fault could be found in roadbed, track, engine or cars.

### Illuminating Engineering Society.

The sixth annual convention of the Illuminating Engineering Society will be held at the Hotel Clifton, Niagara Falls, Ont., September 16 to 19. A large number of papers and reports will be presented. A report on Progress deals with recent developments in the lighting industry, both in this country and abroad. There will also be reports on Nomenclature and Standards and on Steel Mill Lighting. Among the individual papers which will be read are: Indirect and Semi-Indirect Illumination; Diffuse Reflection; A Study of Natural and Artificial Light Distribution in Interiors; The Physiology of Vision; The Efficiency of the Eye Under Different Systems of Illumination; Illumination Charts, and the Determination of Illumination Efficiency. The office of the general secretary of the society, Preston S. Millar, is at 29 West Thirty-ninth street, New York City.

## MEETINGS AND CONVENTIONS.

*The following list gives names of secretaries, dates of next or regular meetings, and places of meeting.*

AIR BRAKE ASSOCIATION.—F. M. Nellis, 53 State St., Boston, Mass. Convention, May, 1913, St. Louis, Mo.

AMERICAN ASSOCIATION OF DEMURRAGE OFFICERS.—A. G. Thomason, Boston, Mass,

AMERICAN ASSOCIATION OF GENERAL PASSENGER AND TICKET AGENTS.—W. C. Hope, New York; next convention, September 12, Seattle, Wash.

AMERICAN ASSOCIATION OF FREIGHT AGENTS.—R. O. Wells, East St. Louis, Ill.

AMERICAN ASSOCIATION OF RAILROAD SUPERINTENDENTS.—W. C. Cooder, Carew building, Cincinnati, Ohio; 3d Friday of March and September.

AMERICAN ELECTRIC RAILWAY ASSOCIATION.—H. C. Donecker, 29 W. 39th St., New York. Convention, October 7-11, Chicago.

AMERICAN ELECTRICAL RAILWAY MANUFACTURERS' ASSOC.—George Keegan, 165 Broadway, New York. Meetings with Am. Elec. Ry. Assoc.

AMERICAN RAILWAY ASSOCIATION.—W. F. Allen, 75 Church St., New York; annual, November 20, 1912, Chicago.

AMERICAN RAILWAY BRIDGE AND BUILDING ASSOCIATION.—C. A. Lichty, C. & N. W., Chicago. Convention, 3d week in Oct., Baltimore, Md.

AMERICAN RAILWAY ENGINEERING ASSOCIATION.—E. H. Fritch, 1011 S. Michigan Ave., Chicago. Convention, March 18-20, 1913, Chicago.

AMERICAN RAILWAY MASTER MECHANICS' ASSOC.—J. W. Taylor, Old Colony building, Chicago.

AMERICAN RAILWAY TOOL FOREMEN'S ASSOCIATION.—M. H. Bray, N. Y. N. H. & H., New Haven, Conn.

AMERICAN SOCIETY FOR TESTING MATERIALS.—Prof. E. Marburg, University of Pennsylvania, Philadelphia, Pa.; annual, June, 1913.

AMERICAN SOCIETY OF CIVIL ENGINEERS.—C. W. Hunt, 220 W. 57th St., New York; 1st and 3d Wed., except June and August, New York.

AMERICAN SOCIETY OF ENGINEERING CONTRACTORS.—J. R. Wemlinger, 13 Park Row, New York; 2d Tuesday of each month, New York.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS.—Calvin W. Rice, 29 W. 39th St., New York.

AMERICAN WOOD PRESERVERS' ASSOCIATION.—F. J. Angier, B. & O., Baltimore, Md. Convention, 3d week in January, 1913, Chicago.

ASSOCIATION OF AMERICAN RAILWAY ACCOUNTING OFFICERS.—C. G. Phillips, 143 Dearborn St., Chicago.

ASSOCIATION OF RAILWAY CLAIM AGENTS.—J. R. McSherry, C. & E. I., Chicago.

ASSOCIATION OF RAILWAY ELECTRICAL ENGINEERS.—Jos. A. Andreucetti, C. & N. W. Ry., Chicago; annual, October 21-25, Chicago.

ASSOCIATION OF RAILWAY TELEGRAPH SUPERINTENDENTS.—P. W. Drew, 112 West Adams St., Chicago; annual, May 20, 1913, St. Louis, Mo.

ASSOCIATION OF TRANSPORTATION AND CAR ACCOUNTING OFFICERS.—G. P. Conard, 75 Church St., New York. Meeting Dec. 10-11, 1912, New Orleans, La.

CANADIAN RAILWAY CLUB.—James Powell, Grand Trunk Ry., Montreal, Que.; 2d Tuesday in month, except June, July and Aug., Montreal.

CANADIAN SOCIETY OF CIVIL ENGINEERS.—Clement H. McLeod, 413 Dorchester St., Montreal, Que.; Thursdays, Montreal.

CAR FOREMEN'S ASSOCIATION OF CHICAGO.—Aaron Kline, 841 North 50th Court, Chicago; 2d Monday in month, Chicago.

CENTRAL RAILWAY CLUB.—H. D. Vought, 95 Liberty St., New York; 2d Thurs. in Jan. and 2d Fri. in March, May, Sept., Nov., Buffalo, N. Y.

CIVIL ENGINEERS' SOCIETY OF ST. PAUL.—L. S. Pomeroy, Old State Capitol building, St. Paul, Minn.; 2d Monday, except June, July, August and September, St. Paul.

ENGINEERS' SOCIETY OF PENNSYLVANIA.—E. R. Dasher, Box 704, Harrisburg, Pa.; 1st Monday after 2d Saturday, Harrisburg, Pa.

ENGINEERS' SOCIETY OF WESTERN PENNSYLVANIA.—E. K. Hiles, 803 Fulton building, Pittsburgh; 1st and 3d Tuesday, Pittsburgh, Pa.

FREIGHT CLAIM ASSOCIATION.—Warren P. Taylor, Richmond, Va.

GENERAL SUPERINTENDENTS' ASSOCIATION OF CHICAGO.—E. S. Koller, 226 W. Adams St., Chicago; Wed. preceding 3d Thurs., Chicago.

INTERNATIONAL RAILWAY CONGRESS.—Executive Committee, 11, rue de Louvain, Brussels, Belgium. Convention, 1915, Berlin.

INTERNATIONAL RAILWAY FUEL ASSOCIATION.—C. G. Hall, 922 McCormick building, Chicago.

INTERNATIONAL RAILWAY GENERAL FOREMEN'S ASSOCIATION.—L. H. Bryan, Brown Marx building, Birmingham, Ala.

INTERNATIONAL RAILROAD MASTER BLACKSMITHS' ASSOCIATION.—A. L. Woodworth, Lima, Ohio. Convention, August 20, Chicago.

MAINTENANCE OF WAY MASTER PAINTERS' ASSOCIATION OF THE UNITED STATES AND CANADA.—W. G. Wilson, Lehigh Valley, Easton, Pa. Convention, November 19-21, Chicago.

MASTER BOILER MAKERS' ASSOCIATION.—Harry D. Vought, 95 Liberty St., New York. Convention, May, 1913, Chicago.

MASTER CAR BUILDERS' ASSOCIATION.—J. W. Taylor, Old Colony building, Chicago.

MASTER CAR AND LOCOMOTIVE PAINTERS' ASSOC. OF U. S. AND CANADA.—A. P. Dane, B. & M., Reading, Mass. Convention, September, 10-13, Denver, Col.

NATIONAL RAILWAY APPLIANCES ASSOC.—Bruce V. Crandall, 537 So. Dearborn St., Chicago. Meetings with Am. Ry. Eng. Assoc.

NEW ENGLAND RAILROAD CLUB.—G. H. Frazier, 10 Oliver St., Boston, Mass.; 2d Tuesday in month, except June, July, Aug. and Sept., Boston.

NEW YORK RAILROAD CLUB.—H. D. Vought, 95 Liberty St., New York; 3d Friday in month, except June, July and August, New York.

NORTHERN RAILROAD CLUB.—C. L. Kennedy, C. M. & St. P., Duluth, Minn.; 4th Saturday, Duluth.

PEORIA ASSOCIATION OF RAILROAD OFFICERS.—M. W. Rotchford, Union Station, Peoria, Ill.; 2d Tuesday.

RAILROAD CLUB OF KANSAS CITY.—C. Manlove, 1008 Walnut St., Kansas City, Mo.; 3d Friday in month, Kansas City.

RAILWAY BUSINESS ASSOCIATION.—Frank W. Noxon, 2 Rector St., New York; annual, November 20, 1912, New York.

RAILWAY CLUB OF PITTSBURGH.—J. B. Anderson, Penna. R. R., Pittsburgh, Pa.; 4th Friday in month, except June, July and August, Pittsburgh.

RAILWAY ELECTRICAL SUPPLY MANUFACTURERS' ASSOC.—J. Scribner, 1021 Monadnock Block, Chicago. Meetings with Assoc. Ry. Elec. Engrs.

RAILWAY GARDENING ASSOCIATION.—J. S. Butterfield, Lee's Summit, Mo.

RAILWAY DEVELOPMENT ASSOCIATION.—W. Nicholson, Kansas City Southern, Kansas City, Mo. Next meeting, Nov. 17, 1912, Cincinnati, Ohio.

RAILWAY SIGNAL ASSOCIATION.—C. C. Rosenberg, Bethlehem, Pa. Convention, Oct. 8-11, Quebec.

RAILWAY STOREKEEPERS' ASSOCIATION.—J. P. Murphy, Box C, Collinwood, Ohio.

RAILWAY SUPPLY MANUFACTURERS' ASSOC.—J. D. Conway, 2135 Oliver bldg., Pittsburgh, Pa. Meetings with M. M. and M. C. B. assocs.

RAILWAY TEL. AND TEL. APPLIANCE ASSOC.—W. E. Harkness, 284 Pearl St., New York. Meetings with Assoc. of Ry. Teleg. Sups.

RICHMOND RAILROAD CLUB.—F. O. Robinson, Richmond, Va.; 2d Monday, except June, July and August.

ROADMASTERS' AND MAINTENANCE OF WAY ASSOCIATION.—L. C. Ryan, C. & N. W., Sterling, Ill. September 10-13, Buffalo, N. Y.

ST. LOUIS RAILWAY CLUB.—B. W. Frauenthal, Union Station, St. Louis, Mo.; 2d Friday in month, except June, July and Aug., St. Louis.

SIGNAL APPLIANCE ASSOCIATION.—F. W. Edmonds, 3868 Park Ave., New York. Meetings with annual convention Railway Signal Association.

SOCIETY OF RAILWAY FINANCIAL OFFICERS.—C. Niquist, La Salle St. Station, Chicago.

SOUTHERN ASSOCIATION OF CAR SERVICE OFFICERS.—E. W. Sandwich, A. & W. P. Ry., Montgomery, Ala.; annual, Oct. 17, Atlanta, Ga.

SOUTHERN & SOUTHWESTERN RAILWAY CLUB.—A. J. Merrill, Grant bldg., Atlanta, Ga.; 3d Thurs., Jan., March, May, July, Sept., Nov., Atlanta.

TOLEDO TRANSPORTATION CLUB.—J. G. Macomber, Woolson Spice Co., Toledo, Ohio; 1st Saturday, Toledo.

TRAFFIC CLUB OF CHICAGO.—Guy S. McCabe, La Salle Hotel, Chicago; meetings monthly, Chicago.

TRAFFIC CLUB OF NEW YORK.—C. A. Swope, 290 Broadway, New York; last Tuesday in month, except June, July and August, New York.

TRAFFIC CLUB OF PITTSBURGH.—D. L. Wells, Erie, Pittsburgh, Pa.; meetings monthly, Pittsburgh.

TRAIN DESPATCHERS' ASSOCIATION OF AMERICA.—J. F. Mackie, 7042 Stewart Ave., Chicago.

TRANSPORTATION CLUB OF BUFFALO.—J. M. Sells, Buffalo; first Saturday after first Wednesday.

TRANSPORTATION CLUB OF DETROIT.—W. R. Hurley, L. S. & M. S., Detroit, Mich.; meetings monthly.

TRAVELING ENGINEERS' ASSOCIATION.—W. O. Thompson, N. Y. C. & H. R., East Buffalo, N. Y.; annual, Aug. 27-30, Chicago.

WESTERN CANADA RAILWAY CLUB.—W. H. Rosevear, P. O. Box 1707, Winnipeg, Man.; 2d Monday, except June, July and August, Winnipeg.

WESTERN RAILWAY CLUB.—J. W. Taylor, Old Colony building, Chicago; 3d Tuesday of each month, except June, July and August.

WESTERN SOCIETY OF ENGINEERS.—J. H. Warder, 1735 Monadnock Block, Chicago; 1st Monday in month, except July and August, Chicago.

# Traffic News.

A sailing vessel has been engaged to take barley from a port on the Pacific coast to England at 45 shillings a ton, said to be the highest rate quoted in 18 years.

The minister of agriculture of the province of Alberta has arranged with the Grand Trunk Pacific to run a live stock instruction train over the lines of that company throughout Alberta. Lecturers will instruct the farmers in stock raising and dairying.

The secretary of agriculture has released from the quarantine for scabies in cattle, 51,664 sq. miles of territory in South Dakota, Nebraska, Kansas and Texas. The small areas, in these and adjacent states, which are still subject to quarantine, are nearly free from the disease and it is expected that the quarantine can be removed entirely in a short time.

The Buffalo Freight Terminal & Warehouse Company has been organized at Buffalo, N. Y., to build a warehouse at South Michigan and Ganson streets, and has asked authority from the State Public Service Commission, Second district, to issue stock and exercise its franchises. The warehouse, with about 15,000 ft. of floor space, will stand on land leased from the Cleveland & Buffalo Transit Company, and will have track connection with the Buffalo Creek Railroad.

The proposed rule to make an extra baggage charge on trunks more than 45 in. long, which has been under discussion for many months, has been approved by the railway commission of Canada, but the railway companies do not intend to take advantage of the commission's order until the new rule shall have been adopted in the United States; a country in which the rule has encountered an emergency application of the brakes at nearly every step of the discussion which has been going on during the past year.

The New York Central, on August 1, introduced generally on the dining cars throughout its lines the uniform rate of one dollar for meals. A table d'hote rate was universal in the early days of dining cars and the present change, after several years' trial of charging by the card, would seem to indicate the end of an interesting experiment. Rates a la carte will be continued on cafe cars, which have kitchens below the standard size, and also on four of the extra fare trains, the Twentieth Century Limited, westbound and eastbound, the Lake Shore Limited, westbound, and the Detroiter, eastbound. The retention of the pay-for-what-you-get plan on the small cars appears to be due to lack of facilities in these cars to provide an elaborate meal; while the same plan has been retained on the higher priced trains apparently because the majority of the passengers on those trains are supposed to want a more varied and costly meal than could be afforded for a dollar.

The New York, New Haven & Hartford has granted trackage rights to the Central New England over the New Haven road from Danbury, Conn., westward to Hopewell Junction, 35 miles, and over the branch to Fishkill Landing, two miles. The rental is to be such proportion of $10,000 a month as the C. N. E. train mileage bears to the total train mileage on this section, together with a similar proportion of taxes and maintenance. The eastbound freight trains of the Central New England begin their trips at Campbell Hall, or Maybrook, and by this arrangement, under which they can continue their runs over the western division of the New Haven, the movement of through freight to New England will be facilitated. This object, combined with the desire to relieve the New York division of the New Haven road of freight trains, is given as the reason for making the trackage agreement. In other words, the New Haven road prefers that freight from northeastern Pennsylvania and places in that region, destined for Hartford, New Haven, Boston, etc., shall go across the Poughkeepsie bridge instead of New York harbor.

Tariffs showing westbound transcontinental freight rates, revised with a view to meeting the situation developed by the decisions of the Interstate Commerce Commission and the subsequent negotiations, have been filed at Washington, by the roads interested, to take effect September 2. Class rates to the Pacific coast terminals are generally advanced and many of those to cities in the intermountain territory are reduced. Class rates, however, are no criterion of the actual gross amount of increase or decrease as nearly all the freight goes on commodity tariffs. The tariffs, as now made up, are the result of the agreement, or conditional agreement, between the railways and the merchants of Spokane which was adopted after the decision of the Interstate Commerce Commission in the Spokane and allied cases, and the subsequent appeal to the courts. The agreement, however, could not be carried out, as it was not approved by the commission. From St. Paul, Chicago, Detroit, Buffalo and Atlantic seaboard cities to Spokane the rates now announced are considerably reduced, but yet are somewhat higher than the basis which the commission approved. The tariffs, no doubt, will stand until the appeal of the railways to the Commerce Court against the order of the commission, which has now gone to the Supreme Court, shall have been decided. The Interstate Commerce Commission has indicated its willingness to refrain from taking any action on the new tariffs until the court shall hand down its opinion.

### General Review of Crop Conditions and Prices, August 1.

Crop conditions in general on August 1 average for the United States materially better (12.3 per cent.) than on same date last year, and slightly better (0.3 per cent.) than the average condition of recent years. The month of July was slightly more favorable for crops than the average July and much more favorable than July of last year.

The acreage in field crops is about 1.2 per cent. smaller than last year.

The condition of various crops on August 1 compared with their average condition (not normal) on August 1 of recent years follows:

Peaches, 123.7; apples, 122.1; spring wheat, 112.6; oats, 110.9; hay, 110.2; barley, 107.2; millet, 107.2; flax, 106.2; grapes, 106.1; tomatoes, 105.9; pears, 105.5; hops, 105.0; alfalfa, 104.9; timothy, 104.3; lima beans, 104.3; hemp, 103.9; cantaloupes, 103.8; cabbage, 103.7; kaffir corn, 103.5; onions, 103.5; potatoes, 103.5; broom corn, 102.2; watermelons, 101.8; clover for hay, 101.7; oranges, 101.5; tobacco, 101.2; raspberries, 100.

Pasture, 99.9; sorghum, 99.5; peanuts, 99.4; sweet potatoes, 98.6; beans (dry), 98.5; sugar beets, 98.3; rice, 98.2; buckwheat, 98.0; corn, 96.6; cotton, 94.9; lemons, 94.1; sugar cane, 93.2; blackberries, 90.5.

The yield per acre of winter wheat is 97.4 per cent. of a ten-year average, and of rye 103.7 per cent.

The indications are for a total production of all cereals (125,070,000 tons) of about 13.7 per cent. more than last year, 0.1 per cent. more than in 1910, and 9.8 per cent. more than in 1909. Potato prospects are for about 27 per cent. more than last year, 6 per cent. more than in 1910, but 5 per cent. less than in 1909. Hay prospects are about one-third more than last year, and 6 per cent. more than in 1910 and 1909.

The general or composite condition of all crops combined on August 1, duly weighted, by states, on the basis of 100 representing average conditions (for most crops the ten-year average) is as follows:

Maine, 104.1; New Hampshire, 109.3; Vermont, 105.9; Massachusetts, 100.3; Rhode Island, 91.3; Connecticut, 94.2; New York, 98.4; New Jersey, 98.4; Pennsylvania, 101.4, above division, 100.4.

Delaware, 106.1; Maryland, 106.4; Virginia, 104.8; West Virginia, 113.4; North Carolina, 101.8; South Carolina, 95.2; Georgia, 86.8; Florida, 98.9; above division, 97.2.

Ohio, 95.4; Indiana, 92.6; Illinois, 95.8; Michigan, 94.7; Wisconsin, 102.7; above division, 96.0.

Minnesota, 107.8; Iowa, 110.0; Missouri, 101.8; North Dakota, 119.6; South Dakota, 105.3; Nebraska, 96.1; Kansas, 103.3, above division, 106.2.

Kentucky, 98.8; Tennessee, 96.0; Alabama, 93.7; Mississippi, 90.2; Louisiana, 96.3; Texas, 105.6; Oklahoma, 96.4; Arkansas, 93.9; above division, 97.4.

Montana, 104.5; Wyoming, 110.9; Colorado, 114.2; New Mexico, 106.0; Arizona, 108.2; Utah, 104.3; Nevada, 101.2; Idaho, 104.2; Washington, 105.9; Oregon, 110.6; California, 99.1; above division, 105.1.

Prices paid to producers of the United States on August 1 of 1912 and 1911, respectively, averaged as follows: Corn, 79.3c., 65.8c. per bu.; wheat, 89.7c., 82.7c.; oats, 44.3c., 40.2c.; barley, 66.8c., 69.3s.; rye, 77.9c.; 75.5c.; buckwheat, 83.6c., 76.0c.; flaxseed, 175.2c., 199.2c.; potatoes, 86.5c., 136.0c.; hay, $12.98, $14.67 per ton; cotton, 12.0c., 13.2c. per lb. (the average of prices of above crops, which represent above three-fourths of

the value of all crops, declined 7.6 per cent. during July, whereas in July, 1911, they advanced 8.7 per cent.; they averaged on August 1 about 0.1 per cent. lower than on August 1 last year; on July 1 they averaged 17.5 per cent. higher than on July 1 last year); butter, 23.7c., 21.7c. per lb.; chickens, 11.3c., 11.2c.; eggs, 17.4c., 15.5c. per dozen.

Prices on July 15 of 1912 and 1911, respectively, averaged: Hogs, $6.64, $5.92 per 100 lbs.; beef cattle, $5.44, $4.28; veal, calves, $6.33 $5.74; sheep, $4.21, $4.19; lambs, $5.73, $5.42; milch cows, $45.41, $42.44 each; horses, $142, $139; milk, 22.2c., 20.9c. per gal.; apples, 82c., 95c. per bu.; beans, $2.47, $2.23; sweet potatoes, $1.13, $1.04; onions, $1.14, $1.22; clover seed, $10.64, $8.83; timothy seed, $5.96, $5.48; honey, comb, 13.9c., 13.7c. per lb.; wool, unwashed, 18.9c., 15.4c.; peanuts, 4.9c., 5.0c.; cabbage, $2.29, $2.93 per 100 lbs.; broom corn, $85, $68 per ton; cotton seed, $19.04, $22.70; bran, $28.41, $25.80.

### Car Surpluses and Shortages.

Arthur Hale, chairman of the committee on relations between railways of the American Railway Association in presenting statistical bulletin No. 125, giving a summary of car surpluses and shortages by groups from April 12, 1911, to August 1, 1912, says:

"The total surplus on August 1, 1912, was 65,904 cars; on July 18, 1912, was 75,389 cars, and on August 2, 1911, was 130,136 cars. Compared with the preceding period there is a decrease in the total surplus of 9,485 cars, of which 4,359 is in box, 13 in flat, 3,456 in coal and 1,657 in miscellaneous. The decrease in coal car surplus is general throughout the country except in groups 1 (New England Lines) 2 (New York, New Jersey, Delaware, Maryland and Eastern Pennsylvania), 9 (Texas, Louisiana and New Mexico), and 10 (Washington, Oregon, Idaho, California, Nevada and Arizona). The decrease in box car surplus is chiefly in groups 2 (as above), 3 (Ohio, Indiana, Michigan and Western Pennsylvania), 6 (Iowa, Illinois, Wisconsin, Minnesota and the Dakotas), 8 (Kansas, Colorado, Missouri, Arkansas and Oklahoma), and 10 (as bove). The decrese in miscellaneous car surplus is chiefly in groups 3 (as above), 4 (the Virginias and the Carolinas), 6 (as above), and 7 (Montana, Wyoming and Nebraska).

"The total shortage on August 1, 1912, was 9,394 cars; on July 18, 1912, was 6,467 cars, and on August 2, 1911, was 2,045 cars. Compared with the preceding period there is an increase in the total shortage of 2,927 cars, of which 1,701 is in box, 614 in flat, 705 in coal, and a decrease of 93 miscellaneous cars. The increase in coal car shortage is general throughout the country except in groups 1, 7 and 8 (as above). The increase in box car shortage is most apparent in groups 1, 6 and 8 (as above). The increase in flat car shortage prevails generally throughout the country.

"Compared with the same date of 1911; there is a decrease in the total surplus of 64,232 cars, of which 15,570 is in box, 2,512 in flat, 35,918 in coal, and 10,232 in miscellaneous cars. There is an increase in the total shortage of 7,349 cars, of which 3,638 is in box, 1,745 in flat, 1,874 in coal, and 92 in miscellaneous cars."

The accompanying table gives car surplus and shortage figures by groups for the last period covered in the report, and the diagram shows total bi-weekly surpluses and shortages from 1907 to 1912.

### General Crop Conditions.

The department of agriculture estimates crop conditions to be as follows:

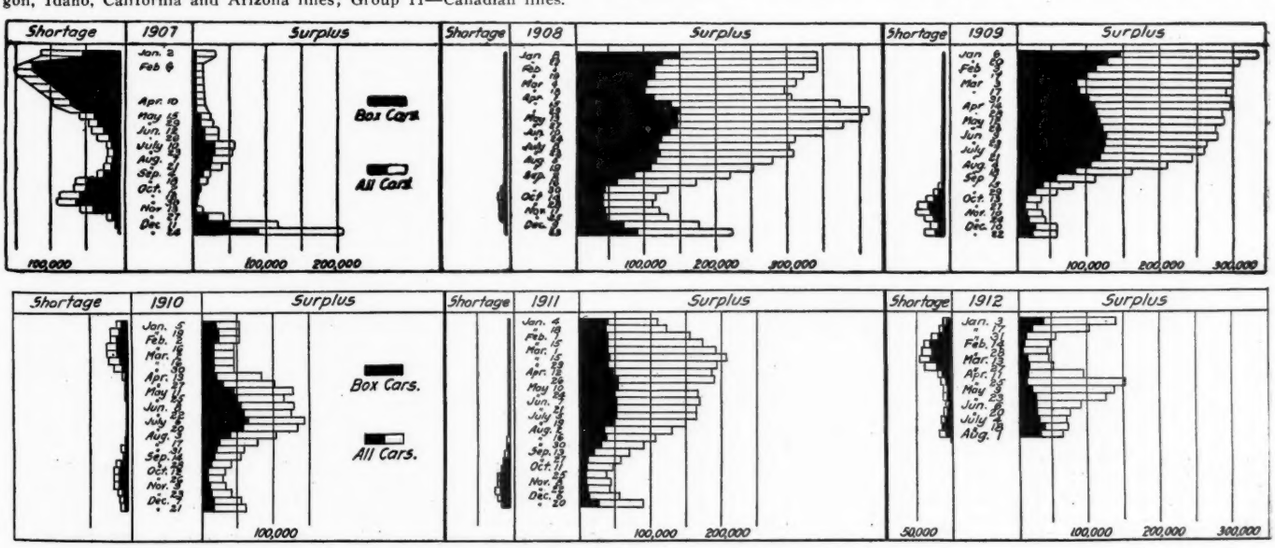
FOR THE UNITED STATES.

| Crops | Condition, August 1. 1912. | 1911. | 10-yr. av. | Acreage, 1912. July 1, 1912. | Per cent. of 1911. | Acres. |
|---|---|---|---|---|---|---|
| Corn ..... | 80.0 | 69.6 | 82.8 | 81.5 | 102.2 | 108,110,000 |
| Winter wheat.. | .... | .... | .... | 73.3 | 88.3 | 25,744,000 |
| Spring wheat .. | 90.4 | 59.8 | 80.3 | 89.3 | 94.2 | 19,201,000 |
| All wheat ..... | .... | .... | .... | 80.1 | 90.7 | 44,945,000 |
| Oats ..... | 90.3 | 65.7 | 81.4 | 89.2 | 100.2 | 37,844,000 |

CAR SURPLUSES AND SHORTAGES.

| Date. | No. of roads. | Surpluses Box. | Flat. | Coal, gondola and hopper. | Other kinds. | Total. | Shortages Box. | Flat. | Coal, gondola and hopper. | Other kinds. | Total. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Group *1.—August 1, 1912..... | 7 | 425 | 230 | 89 | 49 | 793 | 525 | 120 | 295 | 35 | 975 |
| " 2.— " 1, 1912..... | 25 | 1,881 | 74 | 3,262 | 764 | 5,981 | 68 | 8 | 261 | 3 | 340 |
| " 3.— " 1, 1912..... | 29 | 3,523 | 239 | 2,946 | 2,032 | 8,740 | 16 | 365 | 110 | 36 | 527 |
| " 4.— " 1, 1912..... | 11 | 162 | 0 | 387 | 675 | 1,224 | 1,114 | 750 | 1,535 | 0 | 3,399 |
| " 5.— " 1, 1912..... | 21 | 729 | 0 | 210 | 1,228 | 2,167 | 291 | 401 | 482 | 0 | 1,174 |
| " 6.— " 1, 1912..... | 25 | 11,562 | 300 | 890 | 5,154 | 17,906 | 329 | 124 | 94 | 7 | 554 |
| " 7.— " 1, 1912..... | 4 | 0 | 19 | 15 | 0 | 34 | 322 | 0 | 0 | 0 | 322 |
| " 8.— " 1, 1912..... | 17 | 915 | 160 | 748 | 4,835 | 6,658 | 1,040 | 200 | 0 | 0 | 1,240 |
| " 9.— " 1, 1912..... | 12 | 1,234 | 191 | 476 | 1,084 | 2,985 | 250 | 0 | 0 | 0 | 250 |
| " 10.— " 1, 1912..... | 23 | 7,528 | 931 | 2,941 | 7,700 | 19,100 | 0 | 28 | 2 | 0 | 30 |
| " 11.— " 1, 1912..... | 7 | 75 | 0 | 0 | 241 | 316 | 242 | 249 | 0 | 92 | 583 |
| Total ..... | 181 | 28,034 | 2,144 | 11,964 | 23,762 | 65,904 | 4,197 | 2,245 | 2,779 | 173 | 9,394 |

*Group 1 is composed of New England lines; Group 2—New York, New Jersey, Delaware, Maryland and Eastern Pennsylvania lines; Group 3—Ohio, Indiana, Michigan and Western Pennsylvania lines; Group 4—West Virginia, Virginia, North and South Carolina lines; Group 5—Kentucky, Tennessee, Mississippi, Alabama, Georgia and Florida lines; Group 6—Iowa, Illinois, Wisconsin, Minnesota and the Dakotas lines; Group 7—Montana, Wyoming and Nebraska lines; Group 8—Kansas, Colorado, Missouri, Arkansas and Oklahoma lines; Group 9—Texas, Louisiana and New Mexico lines; Group 10—Oregon, Idaho, California and Arizona lines; Group 11—Canadian lines.




Car Surpluses and Shortages in 1907 to 1912.

GENERAL CROP CONDITIONS FOR THE UNITED STATES—(CONTINUED).

| Crops | Condition, August 1. 1912. | 1911. | 10-yr. av. | Acreage, 1912. July 1, 1912. | Per cent. of 1911. | Acres. |
|---|---|---|---|---|---|---|
| Barley | 89.1 | 66.2 | 83.1 | 88.3 | 99.3 | 7,574,000 |
| Rye | .... | .... | .... | 88.2 | 98.6 | 2,097,000 |
| Buckwheat | 88.4 | 82.9 | 90.2 | .... | 100.2 | 835,000 |
| White potatoes | 87.8 | 62.3 | 84.8 | 88.9 | 101.9 | 3,689,000 |
| Tobacco | 82.8 | 68.0 | 81.8 | 87.7 | 117.9 | 1,194,200 |
| Flax | 87.5 | 71.0 | a82.4 | 88.9 | 108.5 | 2,992,000 |
| Rice | 86.3 | 88.3 | 87.9 | 86.3 | 102.0 | 710,100 |
| Hay, all tame | 91.0 | 68.6 | b82.6 | 85.2 | c102.0 | c49,209,000 |
| Apples | 65.8 | 53.9 | 53.9 | 67.9 | ..... | ..... |

*a* Nine-year average. *b* Four-year average.
*c* Hay figures of the Bureau have been revised to conform to the Census classification and basis; changes are due mostly to the inclusion of grains cut green for hay, not included in the previous basis of estimation.

The yields indicated by the condition of crops on August 1, 1912, and final yields in preceding years, for comparison, follow:

| Crop. | Yield per acre. 1912.a Bus. | 1911 Final. Bus. | 1906-1910 av. Bus. | Total production in millions of bushels. 1912.a | 1911 Final. | 1910 Final. | 1909 Census. |
|---|---|---|---|---|---|---|---|
| Corn | 26.0 | 23.9 | 27.1 | 2,811 | 2,531 | 2,886 | 2,552 |
| Winter wheat | b15.1 | 14.8 | 15.5 | b390 | 430 | 434 | 418 |
| Spring wheat | 15.1 | 9.4 | 13.4 | 290 | 191 | 201 | 265 |
| All wheat | 15.1 | 12.5 | 14.6 | 680 | 621 | 635 | 683 |
| Oats | 31.9 | 24.4 | 28.4 | 1,207 | 922 | 1,186 | 1,007 |
| Barley | 26.7 | 21.0 | 24.8 | 202 | 160 | 174 | 173 |
| Rye | b16.9 | 15.6 | 16.3 | b35 | 33 | 35 | 30 |
| Buckwheat | 19.3 | 21.1 | 19.5 | 16 | 18 | 18 | 15 |
| White potatoes | 100.7 | 80.9 | 96.8 | 371 | 298 | 349 | 389 |
| Tobacco, lbs | 820.6 | 893.7 | 828.0 | 980 | 905 | 1,103 | 1,056 |
| Flax | c9.4 | 7.0 | 8.7 | 28 | 19 | 13 | 20 |
| Rice | 31.9 | 32.9 | 32.4 | 23 | 23 | 25 | .. |
| Hay, all tame, tons | d1.49 | 1.49 | 1.42 | 73 | 55 | 69 | 69 |

*a* Interpreted from condition reports.
*b* Preliminary estimate.
*c* Based on average for 1905-1909.
*d* Based on average for 1908-10.

The quality of winter wheat is 90.7, against 92.0 last year and 91.1 the 5-year average (1907-11).

The quality of rye is 94.0, against 91.5 last year and 92.0 the 10-year average.

The amount of oats remaining on farms August 1 is estimated at 3.8 per cent. of last year's crop, or about 34,872,000 bu. as compared with 67,793,000 bu. on August 1, 1911, and 64,199,000 on August 1, 1910.

Details for important crops in principal states follow:

CORN.

| States. | Per cent. of U. S. acreage in State. | Condition. August 1, 1912. | July 1, 1912. | August 1, 1911. | 10-year Aug. av. |
|---|---|---|---|---|---|
| Illinois | 9.9 | 79 | 78 | 74 | 85 |
| Iowa | 9.3 | 89 | 83 | 68 | 83 |
| Kansas | 7.9 | 73 | 84 | 54 | 79 |
| Missouri | 7.1 | 81 | 83 | 61 | 82 |
| Nebraska | 7.0 | 79 | 80 | 64 | 83 |
| Texas | 6.8 | 75 | 84 | 40 | 73 |
| Oklahoma | 5.0 | 65 | 90 | 33 | 76 |
| Indiana | 4.6 | 80 | 77 | 80 | 86 |
| Ohio | 3.8 | 81 | 77 | 80 | 85 |
| Georgia | 3.7 | 75 | 78 | 89 | 88 |
| Kentucky | 3.3 | 83 | 82 | 74 | 86 |
| Tennessee | 3.1 | 81 | 86 | 91 | 87 |
| Alabama | 2.9 | 81 | 82 | 91 | 85 |
| Mississippi | 2.9 | 79 | 82 | 89 | 82 |
| North Carolina | 2.6 | 86 | 88 | 78 | 86 |
| Arkansas | 2.4 | 80 | 84 | 82 | 84 |
| South Dakota | 2.3 | 83 | 76 | 75 | 86 |
| Minnesota | 2.1 | 83 | 78 | 81 | 82 |
| Virginia | 1.8 | 85 | 88 | 70 | 86 |
| South Carolina | 1.8 | 79 | 79 | 80 | 84 |
| Louisiana | 1.7 | 81 | 77 | 76 | 82 |
| Wisconsin | 1.5 | 81 | 77 | 85 | 82 |
| Michigan | 1.5 | 72 | 72 | 81 | 79 |
| Pennsylvania | 1.3 | 80 | 78 | 87 | 88 |
| United States | 100.0 | 80.0 | 81.5 | 69.6 | 82.8 |

OATS.

| States. | Per cent. of U. S. acreage in State. | Condition. August 1, 1912. | July 1, 1912. | August 1, 1911. | 10-year Aug. av. |
|---|---|---|---|---|---|
| Iowa | 13.1 | 96 | 94 | 68 | 83 |
| Illinois | 11.2 | 94 | 90 | 68 | 78 |
| Minnesota | 7.8 | 92 | 91 | 63 | 84 |
| North Dakota | 6.1 | 94 | 91 | 58 | 77 |
| Nebraska | 6.0 | 78 | 83 | 39 | 78 |
| Wisconsin | 6.0 | 88 | 88 | 80 | 86 |
| Ohio | 5.6 | 96 | 92 | 78 | 85 |
| Indiana | 5.2 | 97 | 95 | 77 | 81 |
| Kansas | 4.5 | 86 | 83 | 35 | 67 |
| South Dakota | 4.1 | 87 | 85 | 24 | 84 |
| Michigan | 3.9 | 87 | 83 | 81 | 85 |
| New York | 3.1 | 77 | 81 | 85 | 91 |
| Pennsylvania | 2.9 | 87 | 88 | 84 | 90 |
| Missouri | 2.7 | 92 | 87 | 38 | 75 |
| United States | 100.0 | 90.3 | 89.2 | 65.7 | 81.4 |

SPRING WHEAT.

| States. | Per cent. of U. S. acreage in State. | Condition. July 1, 1912. | July 1, 1912. | August 1, 1911. | 10-year August av. |
|---|---|---|---|---|---|
| North Dakota | 42.4 | 94 | 92 | 60 | 76 |
| Minnesota | 22.0 | 89 | 89 | 61 | 82 |
| South Dakota | 19.3 | 85 | 83 | 31 | 81 |
| Washington | 6.8 | 87 | 90 | 86 | 81 |
| United States | 100.0 | 90.4 | 89.3 | 59.8 | 80.3 |

WINTER WHEAT.

| States. | 1912, Preliminary. Yield per acre. Bushels. | Production. (000 omitted). | Quality Per cent. | 1911. Yield per acre. Bushels. | Production. (000 omitted). | Quality. Per cent. |
|---|---|---|---|---|---|---|
| Kansas | 16.0 | 85,776 | 93 | 10.8 | 51,030 | 92 |
| Nebraska | 18.0 | 51,408 | 97 | 13.8 | 38,474 | 92 |
| Missouri | 12.4 | 23,932 | 88 | 15.7 | 36,110 | 93 |
| Oklahoma | 13.3 | 20,243 | 84 | 8.0 | 8,976 | 78 |
| Pennsylvania | 18.0 | 22,320 | 92 | 13.5 | 17,402 | 86 |
| Indiana | 8.0 | 9,648 | 77 | 14.7 | 34,354 | 93 |
| Ohio | 8.0 | 9,536 | 82 | 16.0 | 36,240 | 93 |
| Illinois | 8.3 | 9,819 | 79 | 16.0 | 42,000 | 93 |
| Washington | 27.6 | 27,269 | 94 | 27.3 | 25,116 | 97 |
| Virginia | 11.6 | 8,596 | 88 | 12.0 | 9,000 | 92 |
| Michigan | 10.4 | 7,332 | 78 | 18.0 | 18,450 | 90 |
| Texas | 15.0 | 10,560 | 88 | 9.4 | 6,580 | 81 |
| Kentucky | 10.0 | 6,860 | 82 | 12.7 | 9,906 | 93 |
| Tennessee | 10.5 | 7,004 | 86 | 11.5 | 8,280 | 92 |
| Oregon | 26.8 | 16,884 | 87 | 22.2 | 13,009 | 95 |
| North Carolina | 8.9 | 5,322 | 84 | 10.6 | 6,636 | 93 |
| Maryland | 15.0 | 8,970 | 88 | 15.5 | 9,378 | 92 |
| California | 17.5 | 6,738 | 89 | 18.0 | 8,640 | 95 |
| Idaho | 28.4 | 9,656 | 96 | 31.5 | 10,930 | 99 |
| New York | 16.0 | 5,360 | 90 | 19.5 | 6,728 | 91 |
| United States | 15.1 | 389,942 | 90.7 | 14.8 | 430,656 | 92.0 |

## INTERSTATE COMMERCE COMMISSION.

The commission has suspended until December 13 certain tariffs of the Lake Shore, the Wabash and the Grand Trunk which prescribe a charge of $2 a car for carload freight, arriving at Detroit, which, after arrival, is ordered sent to some other road within the city.

### Reparation Awarded.

*Crutchfield & Woolfolk v. Southern Pacific. Opinion by Commissioner Prouty Decided November 6, 1911:*

The commission found that the reicing charges collected from the complainant for the refrigeration of cantaloups from Imperial Valley, Cal., and Yuma, Ariz., to eastern destinations during 1908 and 1909, were excessive. (24 I. C. C., 651.)

## STATE COMMISSIONS.

The Public Service Commission of New Hampshire, having ordered the Boston & Maine to restore a passenger train which had been taken off, has been made defendant in a bill, filed by the road in the court of Strafford county, to test the authority of the commission.

The Mississippi Railroad Commission has completed a two months' examination of the assessments of the railways and other public service corporations of the state, and it is estimated that the revisions which have been made will increase the total of the valuations in the state about 25 per cent. The officers of the railways interested have been heard by the commission, and it is said that no protests will be made.

The New York State Public Service Comission, Second district, has ordered gates or flagmen at six street crossings of the Erie Railroad in Niagara Falls. At one crossing the order requires two men during the day time, one on the east and the other on the west side, and one man throughout the night. These flagmen must be put on at once, and by October 1, gates must be provided. The commission overruled the argument that it had no authority to make an order of this kind.

## COURT NEWS.

In the federal court at Montgomery, Ala., Judge T. G. Jones, acting on a bill filed by the Mississippi Eastern, has enjoined the Mobile & Ohio from canceling joint tariffs with the M. E. The court will give a hearing August 26.

The Atlantic Coast Line and three other railways of the South have petitioned the Commerce Court for an injunction against the enforcement of the Interstate Commerce Commission's order requiring freight rates from certain western territory be made the same to Newport News as to Norfolk.

## REVENUES AND EXPENSES OF RAILWAYS.

MONTH OF JUNE, 1912.

| Name of road. | Mileage operated at end of period. | Operating revenues | | | Operating expenses | | | | | | Net operating revenue (or deficit). | Outside operations, net. | Taxes. | Operating income (or loss). | Increase (or decr.) comp. with last year. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Maintenance | | | | | | | | | | |
| | | Freight. | Passenger. | Total. inc. misc. | Way and structures. | Of equipment. | Traffic. | Trans-portation. | General. | Total. | | | | | |
| Alabama Great Southern | 309 | $244,524 | $100,231 | $377,985 | $69,310 | $74,316 | $11,741 | $129,620 | $9,154 | $294,141 | $83,844 | $763 | $11,156 | $73,451 | —$9,744 |
| Ann Arbor | 292 | 102,053 | 48,032 | 161,819 | 20,588 | 12,438 | 3,792 | 63,313 | 7,563 | 107,694 | 54,125 | —810 | 13,985 | 39,330 | —588 |
| Arizona Eastern | 365[1] | 145,328 | 35,135 | 192,210 | 15,563 | 15,669 | 2,661 | 50,516 | 9,051 | 93,460 | 98,750 | 118 | 12,021 | 86,847 | 21,157 |
| Belt Ry. Co. of Chicago | 21 | ..... | ..... | 238,613 | 14,814 | 27,785 | 502 | 95,578 | 5,033 | 143,712 | 94,901 | ..... | 6,560 | 88,341 | 8,695 |
| Carolina, Clinchfield & Ohio | 238[2] | 166,521 | 13,771 | 184,755 | 18,216 | 18,901 | 7,937 | 33,085 | 8,835 | 86,974 | 97,781 | ..... | +4,757 | 102,538 | 35,982 |
| Carolina, Clinchfield & Ohio Ry. of S. C. | 18 | 7,347 | 1,292 | 8,932 | 1,225 | 92 | 1,010 | 2,454 | 364 | 5,145 | 3,787 | ..... | +105 | 3,892 | 2,450 |
| Chesapeake & Ohio Lines | 2,887[3] | 2,221,749 | 497,376 | 2,911,278 | 354,689 | 440,558 | 66,820 | 826,844 | 81,264 | 1,770,175 | 1,141,103 | 8,092 | 81,903 | 1,067,292 | 300,126 |
| Chicago & Erie | 270 | 390,311 | 62,588 | 494,383 | 32,210 | 83,490 | 24,240 | 198,016 | 10,267 | 348,223 | 146,160 | 26 | 3,728 | 142,458 | —13,061 |
| Cincinnati, Hamilton & Dayton | 1,015 | 634,544 | 129,475 | 855,769 | 75,442 | 123,558 | 22,538 | 335,163 | 19,843 | 576,544 | 279,225 | ..... | 29,892 | 249,333 | 62,920 |
| Cincinnati, New Orleans & Texas Pacific | 337 | 635,209 | 139,857 | 819,897 | 91,012 | 187,173 | 21,039 | 234,592 | 21,033 | 554,849 | 265,048 | —867 | 31,800 | 232,381 | 9,913 |
| Colorado & Southern | 1,073[4] | 433,583 | 113,980 | 586,494 | 86,351 | 124,026 | 14,257 | 196,433 | 21,212 | 422,279 | 144,215 | —2,837 | 29,175 | 112,203 | —83,834 |
| Fort Worth & Denver City | 454 | 180,275 | 103,746 | 303,787 | 38,397 | 59,015 | 6,155 | 117,615 | 14,137 | 235,319 | 68,468 | —1,094 | 10,633 | 56,741 | —60,097 |
| Galveston, Harrisburg & San Antonio | 1,338 | 546,211 | 248,418 | 844,938 | 116,812 | 175,479 | 35,470 | 405,350 | 28,505 | 761,616 | 83,322 | —4,310 | 40,285 | 38,727 | —178,541 |
| Georgia, Southern & Florida | 395 | 89,628 | 65,592 | 181,266 | 22,151 | 26,499 | 7,945 | 74,512 | 10,171 | 141,278 | 39,988 | ..... | 11,845 | 28,143 | —6,775 |
| Great Northern | 7,483[5] | 4,148,214 | 1,292,238 | 5,830,534 | 1,525,249 | 625,178 | 96,455 | 1,478,392 | 99,157 | 3,824,431 | 2,006,103 | 20,468 | 264,200 | 1,762,371 | —239,840 |
| Gulf, Colorado & Santa Fe | 1,596[6] | 567,426 | 238,046 | 878,862 | 88,047 | 155,338 | 25,597 | 384,819 | 31,369 | 685,170 | 193,692 | ..... | 43,997 | 149,715 | 16,596 |
| Houston, East & West Texas | 191 | 66,141 | 29,850 | 101,958 | 21,152 | 16,230 | 1,837 | 52,959 | 3,810 | 95,988 | 5,970 | ..... | 5,223 | 747 | —32,978 |
| Houston & Texas Central | 789 | 271,603 | 149,865 | 451,309 | 65,256 | 91,604 | 11,965 | 203,438 | 17,885 | 390,148 | 61,161 | —938 | 22,014 | 38,209 | —45,170 |
| Illinois Central | 4,755[7] | 3,423,447 | 1,152,154 | 5,231,082 | 572,441 | 1,148,059 | 98,434 | 1,938,284 | 117,036 | 3,874,254 | 1,356,828 | —10,792 | 229,282 | 1,116,754 | 43,827 |
| International & Great Northern | 1,160 | 488,603 | 196,909 | 732,950 | 110,524 | 112,278 | 25,852 | 357,494 | 29,171 | 635,319 | 97,631 | —1,229 | 20,000 | 76,402 | ..... |
| Louisville, Henderson & St. Louis | 200 | 54,928 | 32,143 | 94,542 | 31,230 | 14,103 | 5,377 | 37,771 | 3,637 | 92,118 | 2,424 | 521 | 3,000 | —55 | —13,299 |
| Minneapolis & St. Louis | 1,586 | 500,025 | 157,439 | 701,842 | 96,136 | 93,320 | 18,998 | 272,737 | 19,606 | 500,797 | 201,045 | —47 | 27,304 | 173,694 | —11,403 |
| Minneapolis, St. Paul & S. S. Marie | 3,773[8] | 1,514,871 | 539,732 | 2,186,744 | 370,632 | 289,053 | 51,055 | 710,551 | 47,081 | 1,468,372 | 718,372 | 3,720 | 98,508 | 623,584 | 216,035 |
| Missouri, Kansas & Texas | 1,744[9] | 817,978 | 372,686 | 1,309,471 | 32,758 | 249,315 | 32,363 | 399,095 | 39,863 | 753,394 | 556,077 | —7,044 | 66,051 | 482,982 | 43,393 |
| Missouri, Kansas & Texas of Texas | 1,346[10] | 394,291 | 289,433 | 750,293 | 126,531 | 96,783 | 28,343 | 433,156 | 29,916 | 714,729 | 35,564 | —3,540 | 22,000 | 10,024 | —50,055 |
| Mobile & Ohio | 1,114 | 771,441 | 115,759 | 942,140 | 62,489 | 129,784 | 36,277 | 349,124 | 32,648 | 610,322 | 331,818 | —1,125 | 26,186 | 304,507 | 43,680 |
| Nashville, Chattanooga & St. Louis | 1,230 | 683,045 | 243,013 | 995,858 | 133,063 | 153,663 | 41,287 | 394,406 | 31,039 | 753,458 | 242,400 | —1,497 | 27,618 | 213,285 | 32,695 |
| Nevada Northern | 165 | 130,027 | 13,924 | 146,798 | 17,110 | 16,228 | 405 | 28,772 | 3,832 | 66,347 | 80,451 | ..... | 11,583 | 68,868 | 1,278 |
| New York, Chicago & St. Louis | 563[11] | 859,188 | 137,272 | 1,033,456 | 128,351 | 119,933 | 51,245 | 388,092 | 18,318 | 705,939 | 327,517 | —1,604 | 27,550 | 298,363 | 31,807 |
| New York, Ontario & Western | 566[12] | 618,008 | 146,526 | 797,529 | 106,806 | 136,103 | 12,990 | 267,094 | 19,978 | 542,971 | 254,558 | —2,207 | 24,843 | 227,508 | —28,738 |
| Northern Pacific | 6,032[13] | 3,595,062 | 1,443,242 | 5,514,439 | 855,603 | 562,340 | 114,254 | 1,663,728 | 224,518 | 3,420,453 | 2,093,986 | 21,350 | 631,117 | 1,484,219 | 67,091 |
| Northwestern Pacific | 402[14] | 105,693 | 201,482 | 326,913 | 79,734 | 37,745 | 5,021 | 110,328 | 9,597 | 242,425 | 84,488 | ..... | 12,579 | 71,909 | —34,269 |
| Oregon Short Line | 1,762[15] | 1,129,949 | 427,567 | 1,667,593 | 221,936 | 161,899 | 35,042 | 390,513 | 34,566 | 843,956 | 823,637 | —251 | 60,750 | 762,636 | —15,405 |
| Oregon-Washington R. R. & Nav. Co. | 1,920[16] | 775,693 | 439,833 | 1,315,623 | 216,893 | 173,340 | 52,244 | 485,046 | 43,563 | 971,086 | 344,537 | —9,552 | 70,854 | 264,131 | —267,397 |
| Pere Marquette | 2,330[17] | 889,831 | 344,166 | 1,347,978 | 194,274 | 236,093 | 39,616 | 555,863 | 38,969 | 1,064,815 | 283,163 | —12,598 | 53,434 | 217,131 | —6,408 |
| Philadelphia & Reading | 1,015[18] | 3,117,914 | 587,903 | 3,890,684 | 532,069 | 766,917 | 41,626 | 1,225,802 | 71,397 | 2,637,811 | 1,252,873 | 18,075 | 67,290 | 1,203,658 | 16,662 |
| Pittsburgh, Shawmut & Northern | 278[19] | 106,636 | 7,643 | 116,619 | 16,337 | 34,610 | 1,066 | 36,404 | 4,372 | 92,809 | 23,810 | ..... | 1,562 | 22,248 | 28,614 |
| Port Reading | 21 | 124,413 | ..... | 133,670 | 17,490 | 344 | 30 | 29,408 | 80 | 47,352 | 86,318 | 3,123 | 50,000 | 39,441 | —8,130 |
| Richmond, Fredericksburgh & Potomac | 83 | 149,465 | 67,049 | 239,675 | 55,182 | 25,222 | 3,180 | 75,526 | 5,757 | 164,867 | 74,808 | ..... | +1,851 | 76,659 | 82 |
| St. Joseph & Grand Island | 319 | 62,026 | 34,200 | 107,511 | 20,882 | 21,836 | 4,928 | 48,874 | 5,551 | 102,071 | 5,440 | ..... | 6,396 | —956 | —13,575 |
| St. Louis, Brownsville & Mexico | 510[20] | 108,817 | 62,016 | 184,868 | 28,008 | 17,613 | 3,205 | 133,435 | 9,013 | 191,274 | —6,406 | ..... | 7,473 | —13,879 | —44,624 |
| St. Louis, San Francisco & Texas | 244 | 70,854 | 26,853 | 104,026 | 35,170 | 17,728 | 2,084 | 49,144 | 4,594 | 108,720 | —4,694 | ..... | 1,217 | —5,911 | —10,183 |
| St. Louis Southwestern | 906[21] | 491,375 | 114,677 | 626,363 | 84,428 | 80,190 | 24,783 | 164,545 | 41,303 | 395,249 | 231,114 | —678 | 46,370 | 184,066 | —1,575 |
| St. Louis Southwestern of Texas | 703 | 218,900 | 80,163 | 322,824 | 53,490 | 54,130 | 11,407 | 143,398 | 17,119 | 279,544 | 43,280 | —224 | 10,934 | 32,122 | —38,319 |
| San Pedro, Los Angeles & Salt Lake | 1,137[22] | 546,654 | 287,222 | 891,086 | 75,212 | 133,554 | 27,171 | 261,265 | 19,214 | 516,416 | 374,670 | —2,384 | 30,100 | 342,186 | 78,100 |
| Seaboard | 3,070[23] | 1,128,589 | 378,629 | 1,723,429 | 292,045 | 245,848 | 56,188 | 652,693 | 47,144 | 1,293,918 | 429,511 | —2,662 | 80,000 | 346,849 | —127,264 |
| Southern in Mississippi | 281 | 37,833 | 19,049 | 64,654 | 23,873 | 7,051 | 2,240 | 31,871 | 3,889 | 68,924 | —4,270 | ..... | 3,893 | —8,163 | —3,047 |
| Tennessee Central | 294 | 86,248 | 37,535 | 132,542 | 19,699 | 10,339 | 6,422 | 41,482 | 7,866 | 85,808 | 46,734 | ..... | 4,846 | 41,888 | 12,178 |
| Terminal R. R. Ass'n of St. Louis | 35[24] | ..... | 270 | 211,846 | 39,609 | 12,294 | 698 | 74,896 | 9,573 | 137,070 | 74,776 | 11,432 | 26,000 | 60,208 | 35,197 |
| Texas & New Orleans | 458 | 204,302 | 77,799 | 296,633 | 60,136 | 52,994 | 8,903 | 140,764 | 13,162 | 275,059 | 20,674 | —156 | 13,616 | 6,902 | —38,438 |
| Toledo, St. Louis & Western | 451 | 243,003 | 28,113 | 293,967 | 35,509 | 25,931 | 7,161 | 108,435 | 8,624 | 185,660 | 108,307 | ..... | 13,293 | 95,014 | 36,310 |
| Trinity & Brazos Valley | 463 | 86,797 | 40,435 | 134,986 | 45,124 | 31,484 | 10,141 | 107,217 | 10,526 | 204,492 | —69,506 | ..... | 4,000 | —73,506 | —44,152 |
| Ulster & Delaware | 129 | 66,449 | 38,394 | 110,385 | 16,783 | 11,099 | 3,486 | 37,789 | 2,616 | 71,773 | 38,612 | —23 | 3,009 | 35,580 | 36,527 |
| Union Pacific | 3,575[25] | 2,460,988 | 917,768 | 3,772,468 | 564,776 | 470,599 | 97,979 | 1,019,627 | 105,341 | 2,258,322 | 1,514,146 | —3,236 | 177,897 | 1,333,013 | —319,764 |
| Virginian | 475[26] | 352,455 | 22,897 | 389,232 | 68,437 | 66,698 | 5,850 | 85,118 | 10,565 | 236,668 | 152,564 | 4,247 | 17,600 | 139,211 | —18,646 |
| Wabash | 2,515 | 1,569,193 | 631,763 | 2,401,377 | 465,805 | 503,488 | 94,706 | 1,006,835 | 64,955 | 2,135,789 | 265,588 | —3,386 | 71,655 | 190,547 | —267,526 |
| Washington Southern | 36 | 43,699 | 32,528 | 106,093 | 18,842 | 23,181 | 1,506 | 37,496 | 2,732 | 83,757 | 22,336 | ..... | 3,191 | 19,145 | 1,123 |
| Western Pacific | 935 | 323,769 | 118,143 | 469,284 | 73,167 | 42,537 | 31,991 | 178,647 | 25,173 | 351,515 | 117,769 | —1,156 | 17,372 | 99,241 | ..... |
| Wheeling & Lake Erie | 457 | 615,381 | 53,031 | 706,361 | 73,925 | 112,542 | 8,051 | 221,420 | 34,240 | 450,178 | 256,183 | 1,103 | 33,960 | 223,326 | 18,567 |
| Yazoo & Mississippi Valley | 1,372 | 472,752 | 181,154 | 743,102 | 143,253 | 113,479 | 15,364 | 327,291 | 27,117 | 626,504 | 116,598 | 1,422 | 6,237 | 111,783 | —11,200 |

Operated at end of previous period—[1] 355; [2] 236; [3] 2,242; [4] 1,196; [5] 7,344; [6] 1,537; [7] 4,576; [8] 3,770; [9] 1,737; [10] 1,348; [11] 562; [12] 546; [13] 6,017; [14] 376; [15] 1,646; [16] 1,856; [17] 2,332; [18] 1,022; [19] 240; [20] 501; [21] 797; [22] 1,113; [23] 3,046; [24] 34; [25] 3,473; [26] 474. — Indicates Deficits, Losses and Decreases.

## REVENUES AND EXPENSES OF RAILWAYS.

TWELVE MONTHS OF FISCAL YEAR, 1912.

| Name of road. | Mileage operated at end of period. | Operating revenues | | | Operating expenses | | | | | | Net operating revenue (or deficit). | Outside operations, net. | Taxes. | Operating income (or loss). | Increase (or decr.) comp. with last year. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Freight. | Passenger. | Total. inc. misc. | Maintenance: Way and structures. | Maintenance: Of equipment. | Traffic. | Transportation. | General. | Total. | | | | | |
| Alabama Great Southern | 309 | $3,217,742 | $1,159,747 | $4,775,891 | $582,208 | $1,040,604 | $136,827 | $1,509,636 | $120,101 | $3,389,376 | $1,386,515 | —$5,284 | —172,020 | $1,209,211 | $147,194 |
| Ann Arbor | 292 | 1,447,074 | 541,173 | 2,120,385 | 238,049 | 236,678 | 50,442 | 800,711 | 93,569 | 1,419,449 | 700,936 | —7,679 | 167,827 | 525,430 | 72,195 |
| Arizona Eastern | 365[1] | 1,532,027 | 383,407 | 2,059,769 | 277,918 | 162,309 | 28,374 | 545,616 | 83,403 | 1,097,620 | 962,149 | 2,329 | 126,530 | 837,948 | 294,464 |
| Belt. Ry. Co. of Chicago | 21 | ..... | ..... | 2,689,805 | 169,335 | 316,321 | 6,759 | 1,068,189 | 63,351 | 1,623,955 | 1,065,850 | ..... | 71,216 | 994,634 | 70,448 |
| Carolina, Clinchfield & Ohio | 238[2] | 1,984,777 | 149,509 | 2,181,642 | 158,556 | 255,447 | 71,187 | 425,403 | 91,256 | 1,001,849 | 1,179,793 | 2,276 | 81,243 | 1,100,826 | 402,932 |
| Carolina, Clinchfield & Ohio Ry. of S. C. | 18 | 119,213 | 13,825 | 140,161 | 9,213 | 1,071 | 11,752 | 31,522 | 5,319 | 58,877 | 81,284 | ..... | 5,394 | 75,890 | 26,395 |
| Chesapeake & Ohio Lines | 2,887[3] | 27,261,475 | 5,505,536 | 34,289,870 | 3,981,646 | 6,724,460 | 636,967 | 10,503,415 | 789,193 | 22,635,681 | 11,654,189 | 5,061 | 1,014,220 | 10,645,030 | 911,560 |
| Chicago & Erie | 270 | 4,089,662 | 687,952 | 5,270,373 | 663,921 | 1,011,327 | 252,734 | 2,623,475 | 127,969 | 4,679,426 | 590,947 | 23 | 154,767 | 436,203 | —375,990 |
| Cincinnati, Hamilton & Dayton | 1,015 | 7,202,252 | 1,606,145 | 9,861,321 | 1,000,947 | 1,703,448 | 234,812 | 4,153,647 | 224,399 | 7,317,253 | 2,544,068 | ..... | 397,675 | 2,146,393 | 353,677 |
| Cincinnati, New Orleans & Texas Pacific | 337 | 7,503,581 | 1,746,678 | 9,756,266 | 1,005,493 | 2,165,571 | 246,443 | 2,835,008 | 230,394 | 6,482,909 | 3,273,357 | —6,493 | 271,600 | 2,995,264 | 176,976 |
| Colorado & Southern | 1,073[4] | 6,234,774 | 1,342,488 | 8,137,816 | 979,285 | 1,602,952 | 139,644 | 2,627,251 | 270,065 | 5,619,197 | 2,518,619 | —16,369 | 326,871 | 2,175,379 | —492,643 |
| Fort Worth & Denver City | 454 | 3,112,407 | 1,419,468 | 4,780,968 | 483,434 | 794,198 | 81,160 | 1,639,698 | 167,877 | 3,166,367 | 1,614,601 | —8,154 | 135,275 | 1,471,172 | —367,086 |
| Galveston, Harrisburg & San Antonio | 1,338 | 7,243,824 | 2,957,805 | 10,789,689 | 1,346,804 | 2,029,401 | 398,800 | 4,362,874 | 338,157 | 8,476,036 | 2,313,653 | —59,625 | 457,280 | 1,796,748 | —987,252 |
| Georgia, Southern & Florida | 395 | 1,281,122 | 832,006 | 2,447,529 | 260,495 | 468,623 | 88,990 | 968,522 | 111,792 | 1,898,422 | 549,107 | ..... | 125,998 | 423,109 | —34,736 |
| Great Northern | 7,483[5] | 47,877,369 | 13,623,009 | 66,160,622 | 9,195,466 | 7,850,318 | 1,089,710 | 18,177,686 | 1,297,389 | 37,610,569 | 28,550,053 | 118,859 | 3,486,572 | 25,179,340 | 4,641,467 |
| Gulf, Colorado & Santa Fe | 1,596[6] | 8,433,659 | 2,877,796 | 12,111,537 | 1,861,298 | 1,892,261 | 317,042 | 4,888,573 | 395,273 | 9,354,447 | 2,757,090 | ..... | 474,695 | 2,282,395 | 102,962 |
| Houston, East & West Texas | 191 | 875,471 | 324,457 | 1,272,047 | 235,802 | 144,120 | 24,153 | 458,297 | 45,669 | 908,041 | 364,006 | ..... | 51,799 | 312,207 | —120,659 |
| Houston & Texas Central | 789 | 3,702,371 | 1,740,063 | 5,877,735 | 850,232 | 1,025,809 | 221,269 | 2,601,085 | 240,400 | 4,938,795 | 938,940 | —16,462 | 262,145 | 660,333 | —709,243 |
| Illinois Central | 4,755[7] | 37,881,766 | 13,337,562 | 58,727,272 | 7,691,215 | 13,857,548 | 1,400,942 | 23,653,249 | 1,518,512 | 48,121,466 | 10,605,806 | —107,357 | 2,685,730 | 7,812,719 | —6,580,330 |
| International & Great Northern† | 1,160 | 6,224,232 | 1,774,663 | 8,538,875 | 1,004,704 | 1,082,311 | 228,597 | 3,543,728 | 294,666 | 6,154,006 | 2,384,869 | —5,631 | 252,500 | 2,126,738 | ..... |
| Louisville, Henderson & St. Louis | 200 | 792,854 | 402,794 | 1,279,469 | 290,349 | 165,817 | 53,147 | 440,395 | 36,370 | 986,078 | 293,391 | 3,200 | 36,000 | 260,591 | 30,062 |
| Minneapolis & St. Louis | 1,586 | 5,732,103 | 1,709,109 | 7,954,116 | 987,086 | 1,165,079 | 217,291 | 3,552,400 | 252,172 | 6,174,028 | 1,780,088 | —406 | 336,379 | 1,443,303 | —620,975 |
| Minneapolis, St. Paul & S. S. Marie | 3,773[8] | 19,044,284 | 5,702,247 | 26,263,996 | 2,736,516 | 3,349,306 | 563,577 | 8,682,476 | 550,853 | 15,882,728 | 10,381,268 | 79,682 | 1,541,917 | 8,919,033 | 3,190,869 |
| Missouri, Kansas & Texas | 1,744[9] | 11,079,977 | 4,296,305 | 16,441,970 | 1,888,028 | 2,509,715 | 424,672 | 5,440,985 | 511,249 | 10,774,649 | 5,667,321 | —18,611 | 701,005 | 4,947,705 | —293,314 |
| Missouri, Kansas & Texas of Texas | 1,346[10] | 6,492,414 | 3,632,414 | 10,847,485 | 2,132,385 | 1,158,539 | 298,340 | 5,853,161 | 367,414 | 9,809,839 | 1,037,646 | —16,357 | 309,974 | 711,315 | —1,267,414 |
| Mobile & Ohio | 1,114 | 9,107,093 | 1,424,357 | 11,207,732 | 1,269,157 | 2,002,108 | 415,898 | 4,097,170 | 382,819 | 8,167,152 | 3,040,580 | —11,956 | 309,565 | 2,719,059 | —269,183 |
| Nashville, Chattanooga & St. Louis | 1,230 | 8,460,360 | 2,946,753 | 12,262,675 | 1,796,914 | 2,227,346 | 463,317 | 4,569,759 | 321,535 | 9,378,871 | 2,883,804 | —11,267 | 305,506 | 2,567,031 | —180,861 |
| Nevada Northern | 165 | 1,335,888 | 138,428 | 1,509,863 | 165,857 | 179,652 | 4,677 | 318,108 | 42,369 | 710,663 | 799,200 | ..... | 68,365 | 730,835 | 11,366 |
| New York, Chicago & St. Louis | 563[11] | 9,626,330 | 1,526,267 | 11,593,474 | 1,312,397 | 1,254,596 | 562,596 | 4,879,987 | 207,182 | 8,216,758 | 3,376,716 | —22,759 | 388,675 | 2,965,282 | 346,328 |
| New York, Ontario & Western | 566[12] | 6,545,777 | 1,633,911 | 8,527,944 | 1,266,413 | 1,533,195 | 132,470 | 3,366,316 | 210,147 | 6,508,541 | 2,019,403 | —33,411 | 221,926 | 1,764,066 | —732,417 |
| Northern Pacific | 6,032[13] | 43,793,522 | 15,343,752 | 63,423,947 | 7,861,491 | 7,207,716 | 1,202,293 | 20,756,387 | 1,130,630 | 38,158,517 | 25,265,430 | 312,750 | 3,739,079 | 21,839,101 | —488,976 |
| Northwestern Pacific | 402[14] | 1,347,692 | 1,892,650 | 3,499,100 | 641,870 | 486,384 | 43,544 | 1,276,494 | 115,326 | 2,563,618 | 935,482 | ..... | 143,175 | 792,307 | 58,206 |
| Oregon Short Line | 1,762[15] | 14,802,624 | 4,613,529 | 20,695,358 | 2,491,454 | 2,000,597 | 351,078 | 5,069,546 | 427,937 | 10,340,612 | 10,354,746 | —9,145 | 1,184,465 | 9,161,136 | 512,770 |
| Oregon-Washington R. R. & Nav. Co. | 1,920[16] | 10,213,747 | 4,941,563 | 16,298,682 | 2,187,699 | 1,764,374 | 536,460 | 5,854,753 | 534,993 | 10,878,279 | 5,420,403 | —13,072 | 1,143,167 | 4,264,164 | 2,063,745 |
| Pere Marquette | 2,330[17] | 11,255,766 | 4,045,588 | 16,676,428 | 2,064,891 | 2,804,938 | 423,916 | 7,707,865 | 407,194 | 13,408,804 | 3,267,624 | —75,177 | 667,704 | 2,524,743 | 136,716 |
| Philadelphia & Reading | 1,015[18] | 35,541,227 | 6,908,760 | 44,476,525 | 4,161,751 | 8,308,641 | 493,719 | 14,753,303 | 799,464 | 28,516,878 | 15,959,647 | 305,160 | 1,056,994 | 15,207,813 | —695,579 |
| Pittsburgh, Shawmut & Northern | 278[19] | 1,356,712 | 101,840 | 1,482,649 | 174,250 | 321,924 | 15,035 | 450,451 | 52,953 | 1,012,613 | 470,036 | ..... | 18,864 | 451,172 | 257,132 |
| Port Reading | 21 | 1,311,905 | ..... | 1,337,023 | 109,940 | 1,982 | 368 | 401,144 | 1,254 | 514,688 | 822,335 | 50,910 | 91,800 | 781,445 | —65,568 |
| Richmond, Fredericksburgh & Potomac | 83 | 1,335,360 | 943,511 | 2,575,535 | 330,850 | 309,670 | 35,072 | 929,165 | 70,563 | 1,675,320 | 900,215 | ..... | 10,184 | 890,031 | 2,531 |
| St. Joseph & Grand Island | 319 | 996,848 | 405,478 | 1,545,825 | 274,732 | 280,465 | 59,708 | 691,661 | 77,104 | 1,383,670 | 162,155 | 1,279 | 80,858 | 82,576 | —57,550 |
| St. Louis, Brownsville & Mexico | 510[20] | 1,505,690 | 714,378 | 2,399,794 | 444,263 | 174,883 | 39,732 | 961,212 | 102,829 | 1,722,909 | 676,885 | ..... | 66,858 | 610,027 | 220,131 |
| St. Louis, San Francisco & Texas | 244 | 902,739 | 318,648 | 1,304,250 | 238,874 | 182,304 | 34,275 | 605,773 | 58,496 | 1,119,722 | 184,528 | ..... | 13,189 | 171,339 | 174,854 |
| St. Louis Southwestern | 906[21] | 5,962,994 | 1,311,374 | 7,747,459 | 772,523 | 1,228,144 | 333,208 | 1,954,080 | 336,999 | 4,624,954 | 3,122,505 | —10,916 | 330,135 | 2,781,454 | —101,585 |
| St. Louis Southwestern of Texas | 703 | 3,008,120 | 989,612 | 4,295,083 | 704,546 | 944,125 | 145,946 | 1,790,062 | 209,782 | 3,794,461 | 500,622 | —3,628 | 128,376 | 368,618 | 321,537 |
| San Pedro, Los Angeles & Salt Lake | 1,137[22] | 5,520,077 | 3,011,571 | 9,124,474 | 1,253,689 | 2,025,952 | 377,020 | 3,372,223 | 216,656 | 7,245,540 | 1,878,934 | —44,864 | 300,087 | 1,533,983 | 12,287 |
| Seaboard | 3,070[23] | 15,433,239 | 5,050,068 | 22,921,904 | 3,347,359 | 3,212,278 | 715,361 | 8,333,357 | 671,732 | 16,280,087 | 6,641,817 | —22,686 | 917,000 | 5,702,131 | —771,056 |
| Southern in Mississippi | 281 | 642,637 | 341,814 | 1,065,793 | 287,381 | 103,303 | 28,284 | 442,935 | 48,299 | 910,202 | 155,591 | ..... | 55,959 | 99,632 | —73,391 |
| Tennessee Central | 294 | 1,053,872 | 397,052 | 1,543,690 | 283,308 | 204,437 | 64,906 | 565,849 | 95,841 | 1,214,341 | 329,349 | ..... | 51,147 | 278,202 | —177,081 |
| Terminal R. R. Ass'n of St. Louis | 35[24] | ..... | 2,996 | 2,699,795 | 436,550 | 260,515 | 8,446 | 1,020,993 | 71,253 | 1,797,757 | 902,038 | 114,180 | 325,011 | 691,207 | —76,067 |
| Texas & New Orleans | 458 | 2,548,269 | 1,007,217 | 3,783,781 | 635,323 | 822,855 | 99,008 | 1,567,680 | 130,566 | 3,255,432 | 528,349 | —1,971 | 170,349 | 356,029 | —235,975 |
| Toledo, St. Louis & Western | 451 | 3,207,823 | 408,459 | 3,865,229 | 423,902 | 620,322 | 96,991 | 1,421,708 | 102,935 | 2,665,858 | 1,199,371 | ..... | 179,543 | 1,019,828 | 21,216 |
| Trinity & Brazos Valley | 463 | 2,031,465 | 446,265 | 2,569,456 | 505,693 | 346,155 | 115,372 | 1,249,395 | 133,534 | 2,350,149 | 219,307 | ..... | 50,838 | 168,469 | 123,295 |
| Ulster & Delaware | 129 | 642,131 | 365,627 | 1,061,015 | 148,244 | 137,463 | 21,599 | 431,112 | 30,003 | 768,421 | 292,594 | 729 | 39,309 | 254,014 | 2,803 |
| Union Pacific | 3,575[25] | 32,467,187 | 10,199,004 | 47,186,056 | 4,915,385 | 6,047,204 | 1,232,065 | 13,830,810 | 1,288,965 | 27,314,429 | 19,871,627 | —36,367 | 2,041,156 | 17,794,104 | —4,300,103 |
| Virginian | 475[26] | 4,436,402 | 261,815 | 4,837,598 | 637,739 | 868,927 | 61,960 | 1,302,827 | 100,339 | 2,971,792 | 1,865,806 | 60,318 | 194,200 | 1,731,924 | 364,464 |
| Wabash | 2,515 | 19,074,822 | 6,993,874 | 28,354,764 | 3,889,590 | 5,312,741 | 953,132 | 12,137,368 | 857,653 | 23,150,484 | 5,204,280 | —33,176 | 851,629 | 4,319,475 | —2,253,613 |
| Washington Southern | 36 | 421,647 | 461,853 | 1,181,470 | 159,780 | 155,539 | 15,230 | 451,306 | 32,836 | 814,691 | 366,779 | ..... | 38,883 | 327,896 | —49,776 |
| Western Pacific | 935 | 3,935,719 | 1,139,609 | 5,258,532 | 952,735 | 489,143 | 340,452 | 2,165,242 | 282,292 | 4,229,864 | 1,028,668 | —36,162 | 185,234 | 807,272 | ..... |
| Wheeling & Lake Erie | 457 | 6,434,094 | 603,763 | 7,498,147 | 871,515 | 1,402,076 | 90,315 | 2,485,883 | 188,546 | 5,038,335 | 2,459,812 | 25,933 | 367,225 | 2,118,520 | 276,652 |
| Yazoo & Mississippi Valley | 1,372 | 6,444,066 | 2,417,336 | 9,619,223 | 1,970,336 | 1,449,019 | 192,800 | 3,996,828 | 316,903 | 7,925,886 | 1,693,337 | 2,711 | 420,042 | 1,276,006 | —1,671,606 |

† Figures shown here are for period September 16-June 30.
Operated at end of previous period—[1] 355; [2] 236; [3] 2,242; [4] 1,196; [5] 7,344; [6] 1,537; [7] 4,576; [8] 3,770; [9] 1,737; [10] 1,348; [11] 562; [12] 546; [13] 6,017; [14] 376; [15] 1,646; [16] 1,856; [17] 2,332; [18] 1,022; [19] 240; [20] 501; [21] 797; [22] 1,113; [23] 3,046; [24] 34; [25] 3,473; [26] 474. — Indicates Deficits, Losses and Decreases.

## REVENUES AND EXPENSES OF EXPRESS COMPANIES AS REPORTED TO THE INTERSTATE COMMERCE COMMISSION.

MONTH OF DECEMBER, 1911.

| | Miles of line covered. | | Express revenue. | Gross receipts from operation. | Less express privileges. Dr. | Total operating revenues. | Operating expenses. | | | | Net operating revenue (or deficit —). | Taxes. | Operating income (or loss —). | Increase or decr. (—), comp. with last year. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Steam roads. | Other lines. | | | | | Maintenance. | Traffic. | Trans-portation. | General. | Total. | | | |
| Adams Express Co. | 32,946[1] | 4,843 | $3,365,535 | $3,404,353 | $1,697,541 | $1,706,812 | $84,627 | $10,241 | $1,300,310 | $90,675 | $1,485,853 | $220,958 | $21,598 | $199,360 | $37,610 |
| American Express Co. | 54,855[2] | 1,983 | 3,942,294 | 4,088,954 | 1,894,117 | 2,194,837 | 44,720 | 30,336 | 1,603,157 | 130,922 | 1,809,135 | 385,702 | 32,856 | 352,846 | —195,480 |
| Canadian Express Co. | 6,122[7] | 830 | 276,162 | 281,627 | 129,192 | 152,435 | 3,929 | 1,761 | 103,747 | 7,697 | 117,134 | 35,301 | 2,250 | 33,051 | 1,894 |
| Canadian Northern Express Co. | 4,200[4] | 22 | 62,145 | 64,298 | 24,858 | 39,440 | 105 | 375 | 16,014 | 1,359 | 17,853 | 21,587 | 499 | 21,088 | 8,192 |
| Globe Express Co. | 2,904[5] | ..... | 67,682 | 68,369 | 34,154 | 34,215 | 595 | 1,696 | 24,897 | 4,848 | 32,036 | 2,179 | 800 | 1,379 | —1,765 |
| Great Northern Express Co. | 8,497[6] | 399 | 252,229 | 255,270 | 153,765 | 101,505 | 1,256 | 1,225 | 73,330 | 4,150 | 79,961 | 21,544 | 2,886 | 18,658 | —12,723 |
| National Express Co. | 1,422[7] | 218 | 115,380 | 116,008 | 43,477 | 72,531 | 744 | ..... | 51,063 | 3,195 | 55,002 | 17,529 | 485 | 17,044 | —1,705 |
| Northern Express Co. | 7,310[8] | 315 | 174,715 | 177,337 | 90,083 | 87,254 | 1,609 | 2,952 | 71,082 | 6,158 | 81,801 | 5,453 | 4,500 | 953 | —6,846 |
| Southern Express Co. | 31,936[9] | 821 | 1,193,972 | 1,217,163 | 609,490 | 607,673 | 21,185 | 8,298 | 424,752 | 71,715 | 525,950 | 81,723 | 12,924 | 68,799 | —55,905 |
| United States Express Co. | 29,042[10] | 3,954 | 2,037,953 | 2,065,872 | 967,753 | 1,098,119 | 31,786 | 14,222 | 916,808 | 43,073 | 1,005,889 | 92,230 | 11,332 | 80,898 | —91,543 |
| Wells, Fargo Co. | 63,686[11] | 17,339 | 3,193,410 | 3,245,278 | 1,510,133 | 1,735,145 | 40,881 | 29,412 | 1,146,448 | 89,713 | 1,306,454 | 428,691 | 24,750 | 403,941 | 80,093 |
| Western Express Co. | 4,892[12] | 4 | 105,238 | 107,229 | 54,665 | 52,564 | 840 | 4,043 | 38,933 | 3,085 | 46,901 | 5,663 | 759 | 4,904 | 7,020 |
| **SIX MONTHS OF FISCAL YEAR, 1912.** | | | | | | | | | | | | | | | |
| Adams Express Co. | 32,946[1] | 4,843 | $17,245,017 | $17,450,548 | $8,849,820 | $8,600,728 | $444,579 | $48,237 | $6,653,175 | $506,291 | $7,652,282 | $948,446 | $119,991 | $828,455 | —$67,277 |
| American Express Co. | 54,855[2] | 1,983 | 21,626,154 | 22,515,061 | 10,480,160 | 12,034,901 | 302,320 | 176,504 | 8,910,448 | 738,151 | 10,127,423 | 1,907,478 | 190,689 | 1,716,789 | —128,928 |
| Canadian Express Co. | 6,122[7] | 830 | 1,537,355 | 1,569,493 | 737,215 | 832,278 | 34,294 | 6,768 | 578,833 | 41,906 | 661,801 | 170,477 | 13,500 | 156,977 | —14,475 |
| Canadian Northern Express Co. | 4,200[4] | 22 | 294,769 | 305,365 | 118,478 | 186,887 | 1,178 | 2,427 | 86,059 | 8,243 | 97,907 | 88,980 | 1,313 | 87,667 | 18,448 |
| Globe Express Co. | 2,904[5] | ..... | 428,978 | 432,714 | 215,746 | 216,968 | 4,105 | 9,910 | 150,589 | 24,428 | 189,032 | 27,936 | 4,800 | 23,136 | —23,190 |
| Great Northern Express Co. | 8,497[6] | 399 | 1,521,282 | 1,530,396 | 921,964 | 608,432 | 10,045 | 8,219 | 416,435 | 23,289 | 457,988 | 150,444 | 19,752 | 130,692 | —34,968 |
| National Express Co. | 1,422[7] | 218 | 671,269 | 674,173 | 256,544 | 417,629 | 5,342 | 7 | 298,432 | 18,451 | 322,232 | 95,397 | 2,910 | 92,487 | 877 |
| Northern Express Co. | 7,310[8] | 315 | 1,577,338 | 1,597,956 | 812,648 | 785,308 | 8,984 | 20,459 | 481,538 | 35,554 | 546,535 | 238,773 | 27,000 | 211,773 | —161,517 |
| Southern Express Co. | 31,936[9] | 821 | 7,498,071 | 7,642,052 | 3,614,266 | 4,027,786 | 122,386 | 56,608 | 2,583,500 | 340,732 | 3,103,226 | 924,560 | 89,230 | 835,330 | —83,839 |
| United States Express Co. | 29,042[10] | 3,954 | 10,868,439 | 11,034,313 | 5,049,970 | 5,984,343 | 197,260 | 95,971 | 4,980,108 | 276,258 | 5,549,597 | 434,746 | 64,487 | 370,259 | —182,605 |
| Wells, Fargo & Co. | 63,686[11] | 17,339 | 16,092,240 | 16,383,085 | 7,738,052 | 8,645,033 | 294,589 | 152,423 | 6,135,819 | 508,010 | 7,090,841 | 1,554,192 | 148,456 | 1,405,736 | 103,432 |
| Western Express Co. | 4,892[12] | 4 | 588,475 | 598,668 | 306,996 | 291,672 | 6,286 | 18,677 | 215,045 | 21,092 | 261,100 | 30,572 | 4,546 | 26,026 | 29,388 |

[1] Operated in previous period: Steam Roads—32,692; [2] 55,168; [3] 6,964; [4] 3,369; [5] 2,842; [6] 7,839; [8] 6,601; [9] 31,645; [10] 28,807; [11] 46,675; [12] 3,506. Other Lines—3,727; [2] 2,172; [6] 336; [7] 70; [8] 261; [9] 816; [10] 3,762; [11] 4,492.

# Railway Officers.

## ELECTIONS AND APPOINTMENTS.

### Executive, Financial and Legal Officers.

Paul E. Walker, assistant general attorney of the Chicago, Rock Island & Pacific at Topeka, Kan., has been appointed general attorney, with office at Topeka, succeeding M. A. Low, retired under the pension rules of the company.

Walter L. Ross, vice-president in charge of traffic of the Toledo, St. Louis & Western, and the Chicago & Alton, with headquarters at Chicago, has been elected president of the Toledo, St. Louis & Western, succeeding T. P. Shonts, effective September 1.

The freight claim departments of the New York, New Haven & Hartford, the Boston & Maine, the Maine Central and their subsidiary companies, are now located in North Station, Boston, Mass.; Howard F. Bidwell, freight claim agent of the Boston & Maine, has had his authority extended over all these companies, and George L. Winlock, freight claim agent of the New York, New Haven & Hartford, has been appointed assistant freight claim agent of the above companies, both with headquarters at Boston, as above.

### Operating Officers.

F. E. Ward, general manager of the Chicago, Burlington & Quincy lines east of the Missouri river, with office at Chicago, has resigned on account of ill health.

R. D. Fitzmaurice has been appointed superintendent of the Western division of the New York, New Haven & Hartford, succeeding C. S. Lake, resigned to accept service with another company.

H. G. Harden has been appointed assistant superintendent of Morgan's Louisiana & Texas Railroad & Steamship Company and the Louisiana Western, with office at Lafayette, La., succeeding G. C. Scarlette, resigned.

A. R. Taylor, trainmaster of the St. Louis, Iron Mountain & Southern at Alexandria, La., has been appointed superintendent of the Louisiana division of that road, with office at Monroe, La., succeeding A. G. Abell, resigned.

W. A. Webb, assistant to the president of the Missouri Kansas & Texas, has been appointed also general manager of the Wichita Falls & Northwestern and the Wicihta Falls & Southern, with office at Wichita Falls, Tex.

J. H. Smith has been appointed assistant superintendent of the Grand Rapids division of the Pere Marquette, with office at Grand Rapids, Mich. The trainmasters and chief train despatchers will report to the assistant superintendent.

Phil. Carroll, engineer maintenance of way of the Missouri Pacific-Iron Mountain system, at St. Louis, Mo., has been appointed assistant general superintendent of the Southern district of the St. Louis, Iron Mountain & Southern, with office at Little Rock, Ark.

W. R. Hudson, general superintendent of the Norfolk Southern, with office at Norfolk, Va., having resigned to go to another company, all communications heretofore addressed to Mr. Hudson in the future should be addressed to C. P. Dugan, superintendent of transportation, at Norfolk.

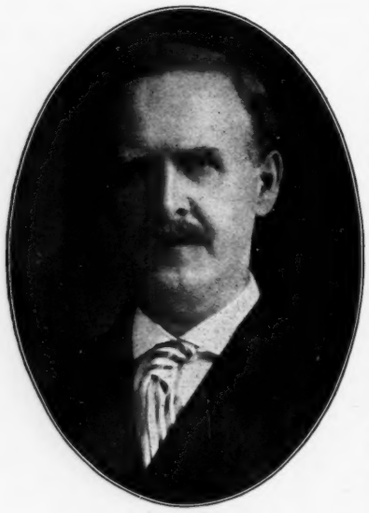
Richard Doyle, trainmaster of the Chicago & Alton, at Springfield, Ill., has been appointed assistant superintendent of the Northern and Southern divisions, with office at Bloomington, Ill., succeeding C. W. Bearden. J. E. Farrell, trainmaster at Roodhouse, Ill., has been appointed trainmaster with authority from Bloomington to St. Louis and from Springfield to Peoria, with office at Bloomington, succeeding Mr. Doyle. C. W. Bearden succeeds Mr. Farrell, and E. E. Sutton has been appointed chief despatcher of the Northern and Southern divisions, with office at Bloomington.

Andrew P. Titus, who has been appointed superintendent of the Toledo division of the Wheeling & Lake Erie, with office at Canton, Ohio, as has been announced in these columns, was born April 11, 1873, on a farm near Princeton, N. J., and was educated at Princeton preparatory school. In July, 1890, Mr.

Titus began railway work at Cleveland, Ohio, where for three years he was in the car department of the Lake Shore & Michigan Southern. From 1893 to 1895 he was with a mining company in Mexico, in the latter year returning to the Lake Shore at Cleveland. Mr. Titus went with the Wheeling & Lake Erie in May, 1900, and he has been with that road ever since. He was first car distributor and chief clerk to the superintendent of car service, and in November, 1905, was promoted to superintendent of car service, with office at Pittsburgh. In May, 1907, he was made assistant superintendent in charge of transportation at Canton, Ohio, from which position he was promoted on July 1, 1912, to superintendent of the Toledo division.

J. E. Fairhead, who has been appointed superintendent of car service of the Kansas City Southern, with office at Kansas City, Mo., as has been announced in these columns, was born August 4, 1879, at Urbana, Ill. He received a public school education at Covington, Ky., and began railway work November 1, 1900, as clerk to the trainmaster of the Chesapeake & Ohio at Huntington, W. Va. Later he was transferred to Covington, Ky., and from October, 1902, to December, 1903, he was stenographer in the office of the general manager of the Cleveland, Cincinnati, Chicago & St. Louis at Cincinnati, Ohio. He was appointed secretary to the president of the Wabash-Pittsburgh Terminal Railway at Pittsburgh, Pa., in December, 1903, and from July of the following year until January, 1905, he was chief clerk to the superintendent of that road. He then became secretary to the general manager of the Cincinnati, Hamilton & Dayton at Cincinnati, and from December, 1905, to February, 1907, he was secretary to the president of the Kansas City Southern. From 1907 until August 1, 1912, the date of his recent promotion to superintendent of car service at Kansas City, he was chief clerk to the general manager and vice-president and general manager.

J. Grant Code, whose appointment as general superintendent of the Wheeling & Lake Erie, with office at Cleveland, Ohio, has been announced in these columns, was born December 27, 1863, at Warren, Ill. He received a public school education in Illinois. Mr. Code began railway work in 1882 on the Chicago & Iowa, now part of the Chicago, Burlington & Quincy, at Rochelle, Ill., and was with that road until 1887, having been at various stations as clerk in the auditor's office, telegraph operator and agent. During the next two years he was with the Chicago, Burlington & Northern, now also part of the Burlington, at La Crosse, Wis., where he was operator, car distributor and train despatcher. From 1889 to 1907 he was train despatcher consecutively with the Union Pacific at Green River, Wyo.; the Oregon Railroad & Navigation Company at La Grande, Ore.; the Northern Pacific at Livingston, Mont.; the Chicago, Burlington & Quincy at La Crosse, Wis., the Northern Pacific at Staples, Minn., and again with the Burlington first at La Crosse and later as chief despatcher at Galesburg, Ill. On January 1, 1907, Mr. Code was appointed assistant superintendent in charge of transportation of the Wheeling & Lake Erie, the Wabash-Pittsburgh Terminal and the West Side Belt Railroad at Canton, Ohio. Five months later he was made superintendent of the Toledo and Pittsburgh division of those roads at Canton, and in June, 1908, when the properties were separated by receivership, he was made superintendent of the Toledo division of the Wheeling & Lake Erie, which position he held at the time of his appointment on July 1, 1912, as general superintendent, with office at Cleveland.



J. G. Code.

### Traffic Officers.

M. O. Culton has been appointed traveling freight and passenger agent of the Erie, with office at Denver, Colo.

H. B. Dyer has been appointed commercial agent of the Chicago, Burlington & Quincy, with office at Cheyenne, Wyo.

J. H. Donnell has been appointed soliciting freight agent of the Georgia Southern & Florida, with office at Atlanta, Ga., succeeding T. N. Bradshaw, resigned.

E. B. Wood, soliciting freight agent of the New Orleans, Texas & Mexico at New Orleans, La., has been appointed traveling freight agent of the Minneapolis & St. Louis, with headquarters at St. Louis, Mo.

O. F. Spindler has been appointed assistant general freight agent of the Chicago Great Western, with office at St. Paul, Minn., effective August 10, succeeding Oscar Townsend, who was promoted to general freight agent in May.

R. J. Daniels, commercial agent of the Chicago, Milwaukee & Puget Sound at Aberdeen, Wash., has been appointed commercial agent, with office at Tacoma, Wash., succeeding H. J. Manny, who has been made traveling freight and passenger agent at Tacoma.

George C. Ransom, division freight agent of the Michigan Central, at Buffalo, N. Y., has been appointed chairman of the Canadian Freight Association, with headquarters at Montreal, Que., succeeding Thomas Marshall, who is now in charge of the traffic department of the Toronto Board of Trade.

E. S. Vincent, traveling freight and passenger agent of Morgan's Louisiana & Texas Railroad & Steamship Company at Little Rock, Ark., has been appointed commercial agent of the Texas & Pacific, with office at Little Rock. H. R. Courtice has been appointed soliciting freight agent, with office at Chicago.

J. M. Cousins has been appointed commerial agent of the Wabash Railroad, with office at New Orleans, La., succeeding Paul J. Fisher, granted leave of absence on account of illness. E. H. George, eastbound agent at Chicago, has been appointed commercial agent in charge of the solicitation of all traffic in the Chicago district.

C. D. Turner, division freight agent of the Erie Railroad at Chicago, will hereafter have jurisdiction over the commercial agency of the Erie Despatch, assuming the duties of W. A. Nelson, resigned. G. C. Cormany, general agent of the Erie Despatch at Dayton, Ohio, has been appointed general agent of the Erie Despatch at Cincinnati, and M. H. Hardy succeeds Mr. Cormany.

George P. Wilson, chief of the tariff bureau of the Pennsylvania Railroad, at Philadelphia, Pa., has been promoted to special agent of the freight department, with headquarters at Philadelphia. Mr. Wilson entered the service of the Pennsylvania Railroad in 1892 as a rate clerk in the office of the general freight agent. He was promoted to chief rate clerk on March 1, 1898, and eight years later he was made chief of the tariff bureau.

The following officers of the Seaboard Air Line have had their authority extended over the Tampa Northern: E. D. Kyle, freight traffic manager; R. I. Cheatham, assistant freight traffic manager; L. E. Chaloner, general freight agent; G. S. Rains, assistant general freight agent; J. A. Pride, general industrial agent, and W. W. Safford, general mail and express agent, all with offices at Norfolk, Va.; C. B. Ryan, general passenger agent, Portsmouth, Va., and B. C. Prince, assistant general freight agent, Jacksonville, Fla.

Alfred Hunt Rising, whose appointment as general freight agent of the Southern Pacific, with office at San Francisco, has been announced in these columns, was born January 19, 1871, at San Francisco. He was educated in the public schools and at Johns Hopkins University. Mr. Rising began railway work in 1883 with the Southern Pacific Company, and he has been in the continuous service of that company. He was clerk in the freight department until October 1, 1905, on which date he was made chief clerk in the general freight department. He was promoted to assistant general freight agent on May 24, 1910, and since July 15, 1912, he has been general freight agent, as noted above.

Frank C. Lathrop, who has been appointed assistant general passenger agent of the Southern Pacific, with office at San Francisco, Cal., as has been announced in these columns, was born April 26, 1872, at Michigan City, Ind., and received a public school education in Wisconsin. He went to California in 1894 and was with the Wilmington Transportation Company for a number of years, having been consecutively purser, city ticket agent and traveling passenger agent. Subsequently he was with the Mexican Central for two years as paymaster on construction work. Mr. Lathrop began work with the Southern Pacific in February, 1903 with which company he has been ever since. He was successively city passenger agent at Los Angeles until May, 1905; traveling passenger agent at the same place to October, 1909, and then commercial agent at Pasadena. He was appointed district passenger agent at Los Angeles on May 1, 1911, and since July 15, 1912, he has been assistant general passenger agent, with office at San Francisco, as noted above.

Under the revised organization of the traffic department of the Western Maryland, made necessary by the extension of the lines of the Western Maryland from Cumberland, Md., to Connellsville, Pa., and the formation of the Pittsburgh Dispatch and Pittsburgh-Erie Dispatch and the extension of the Southern States Dispatch via this route into Pittsburgh and Buffalo territory, T. G. Smiley, general freight agent at Baltimore, Md., is now in charge of all freight traffic of the company (including coal and coke), originating at or destined to Connellsville, Pa., and points east thereof and east of Buffalo, N. Y.; W. A. Cox, assistant general freight agent, at Baltimore, has been appointed general freight agent, with office at Pittsburgh, Pa., in charge of all through freight traffic handled in Pittsburgh Dispatch, Pittsburgh-Erie Dispatch and Southern States Dispatch trade, and all agencies established for the handling of such traffic will report direct to him; T. H. Fee, freight tariff agent at Baltimore, is now in charge of the issuance of all freight tariffs and rate and division matters pertaining thereto; T. H. McKoy is now division freight agent, with office at Hagerstown, Md., in charge of freight traffic on the Maryland division, and J. F. Getty is now division freight agent, with office at Cumberland, in charge of freight traffic on the West Virginia division.

George William Luce, who has been appointed freight traffic manager of the Southern Pacific, with office at San Francisco, Cal., was born at Brownsville, El Dorado county, California, and he received a high school education. From 1875 to 1888 Mr. Luce held various positions with the Southern Pacific, and from October, 1888, to September, 1891, he was general agent in the freight and passenger departments of the Texas & Pacific and the Missouri Pacific at San Francisco. He then went with the Union Pacific at San Francisco, where he was general agent in the freight department until October, 1894. For over three years from October, 1894, he was assistant freight agent of the Southern Pacific at San Francisco, and in February, 1898, was made assistant general freight and passenger agent of the same company at Los Angeles, where he remained until October 15, 1901. On the latter date he was promoted to general freight agent at San Francisco, on March 1 1911, he was made assistant to the vice-president, and since July 15, 1912, he has been freight traffic manager.

G. W. Luce.

### Engineering and Rolling Stock Officers.

F. L. Carson has been appointed master mechanic of the San Antonio & Aransas Pass, with office at Yoakum, Tex., succeeding T. F. Sullivan, resigned.

C. J. Rist, supervisor of the Erie Railroad, at Akron, Ohio, has been appointed division engineer, with office at Huntington, Ind., succeeding A. Swartz, resigned.

H. G. Burnham, chemist and engineer of tests of the Buffalo, Rochester & Pittsburgh, at Du Bois, Pa., has been appointed engineer of tests of the Northern Pacific, with headquarters at St. Paul, Minn.

J. A. Heaman, division engineer of the Grand Trunk Pacific, with office at Fitzhugh, Alta., has been appointed assistant to chief engineer, with headquarters at Winnipeg, Man., and F. J. George succeeds Mr. Heaman, with headquarters at Fitzhugh.

E. G. Chenoweth, mechanical engineer of the Erie Railroad at Meadville, Pa., has been appointed assistant superintendent of the car department of the Chicago Terminal division of the Rock Island Lines, with office at the 124th street shops, Blue Island, Ill.

T. H. Goodnow, general superintendent of the Armour Car Lines at Chicago, has been appointed assistant superintendent of the car department of the Chicago & North Western, with office at Chicago, succeeding C. H. Osborn, resigned to engage in other business.

G. E. Buckley, for six years assistant engineer of the Southern Railway at Charlotte, N. C., has been appointed engineer maintenance of way of the Western district of that road, with office at St. Louis, Mo., succeeding Edward Gray, resigned to engage in other business.

C. A. Steele, division engineer of the Wheeling & Lake Erie, at Canton, Ohio, has been appointed division engineer of the Northern and Southern divisions of the Chicago & Alton, with office at Bloomington, Ill. M. Donahue, general supervisor of roadway and structures of the Alton, has been appointed roadmaster of the Northern and Southern divisions, with office at Bloomington, and his former office has been abolished.

### Purchasing Officers.

Elliott S. Wortham, assistant to the vice-president and purchasing agent of the Chicago & Alton at Chicago, has been appointed manager of purchases and supplies, with office at Chicago, and the office of purchasing agent has been abolished.

## OBITUARY.

Frank Irish, traveling agent of the Chicago & Northwestern at Philadelphia, Pa., died on August 5, at his summer home in Montgomery county, Pa., at the age of 61.

Abraham Harrison Swanson, until 1888 general transportation manager of the Houston & Texas Central, and for many years identified with railway construction and management in Texas, died at Pass Christian, Miss., on August 7, aged 82.

UNION OF SOUTH AFRICA RAILWAYS.—Earnings from April 1, 1912, the beginning of the fiscal year, to June 15 were $12,659,514 This exceeds the earnings for the same period of 1911 by $479,759. The proportion of the total earned by the Natal lines during the period was $2,725,746, compared with $2,558,440 in 1911. Action is being taken by the city of Durban, and the other towns of Natal along the main line of railway and by those of northwestern Orange Free State and southwestern Transvaal to induce the government to construct a railway from Kroonstad to Vierfontein, in Orange River Colony, to connect the present direct line from Durban to Kroonstad with the section already built from Klerksdorp, in the Transvaal, to Vierfontein. Should this section be built it would give Durban a much closer connection with a considerable portion of Orange River Colony and the Transvaal than would be possible from any other port in South Africa, and this province hopes that within a short time a final section from Klerksdorp to Mafeking may also be built, giving the shortest possible route from any port in the Union of South Africa to Rhodesia and the north. The people of Natal have always felt that the territory that would be connected with them by the proposed new section belongs to them commercially, and in order to get possession of it in this way the province completed, in December, 1903, a 65-mile section from Harrismith to Bethlehem, and in June, 1906, another section, of 88 miles, from Bethlehem to Kroonstad.—*Consular Report.*

# Equipment and Supplies.

## LOCOMOTIVE BUILDING.

THE CUBAN CENTRAL is in the market for 3 ten-wheel locomotives.

THE FLORENCE & CRIPPLE CREEK is in the market for 3 Mallet locomotives.

THE CHICAGO SHORT LINE has ordered 1 six-wheel switching locomotive.

THE MINNESOTA, DAKOTA & WESTERN is in the market for 2 or 3 locomotives.

THE SAN ANTONIO & ARANSAS PASS is in the market for 10 consolidation locomotives.

THE UNITED RAILWAYS OF HAVANA, Cuba, are in the market for 5 six-wheel switching locomotives.

THE CARNEGIE STEEL COMPANY, Pittsburgh, Pa., is in the market for 3 six-wheel switching locomotives.

THE CUBAN AMERICAN SUGAR COMPANY has ordered 1 mogul locomotive from the Baldwin Locomotive Works.

THE BRAZILIAN NORTHWESTERN is figuring on 3 ten-wheel locomotives and from 3 to 5 consolidation locomotives.

THE KNIGHT INVESTMENT COMPANY has ordered 1 consolidation locomotive from the Baldwin Locomotive Works.

GREENLEAF JOHNSON LUMBER COMPANY has ordered 1 consolidation locomotive from the Baldwin Locomotive Works.

THE BELT RAILWAY OF CHICAGO has ordered 5 mogul locomotives and 5 switching locomotives from the Baldwin Locomotive Works.

THE CANADIAN NORTHERN has ordered 4 Pacific type locomotives from the Montreal Locomotive Works, and is now in the market for 80 locomotives.

THE PENNSYLVANIA EQUIPMENT COMPANY, Philadelphia, Pa., is in the market for a 45 to 50-ton standard gage six-wheel switching locomotive, a 75-ton consolidation locomotive with 20-in. x 24-in. cylinders, and a 50-ton six-wheel switching locomotive with 18-in. x 24-in. cylinders; all three second hand.

## CAR BUILDING.

THE SAN ANTONIO & ARANSAS PASS is in the market for 500 box cars.

THE PENNSYLVANIA LINES WEST are making inquiries for 50 locomotives.

THE BUFFALO, ROCHESTER & PITTSBURGH has ordered 1,000 hopper cars from the Cambria Steel Company.

THE REPUBLIC IRON & STEEL COMPANY has ordered 1 mogul locomotive from the Baldwin Locomotive Works.

THE CIE DES CHEMINS DE FER FEDERAUX DE L'EST BRESILIEN, Brazil, has ordered 5 dining cars and 5 sleeping cars from the Harlan & Hollingsworth Corporation.

THE SOUTHERN RAILWAY has ordered 15 coaches, 5 combination mail and baggage cars and 5 express cars from the Pullman Company; 5 coaches from the Standard Steel Car Company and 6 dining cars from the Barney & Smith Car Company.

THE PENNSYLVANIA LINES WEST, mentioned in the *Railway Age Gazette* of August 2 as being in the market for 1,000 box cars, have ordered 500 40-ft. steel underframe box cars from the Pressed Steel Car Company and 500 similar cars from the American Car & Foundry Company.

THE OREGON ELECTRIC, Portland, Ore., mentioned in the *Railway Age Gazette* of July 5 as being in the market for 25 coaches and 6 combination passenger and baggage cars, has ordered this equipment from the American Car Company. The cars will be 58 ft. 4½ in. long over buffers and will have the following equipment:

Interior trimming—Mahogany.
Head lining—Agasote.
Air brakes—Westinghouse.
Motors—General Electric.
Trucks—Baldwin.
Seats—Hale & Kilburn.

# Supply Trade News.

The Ralston Steel Car Company, Columbus, Ohio, has almost completed the rebuilding of its plant and the additions which were mentioned in the daily edition of the *Railway Age Gazette* of June 12, page 1283. These improvements will increase the capacity of the plant to 40 cars a day.

F. L. Irwin, chief engineer of the Ralston Steel Car Company, Columbus, Ohio, with office in that city, was killed on August 13 by a train while he was returning in an automobile from the company's plant. Mr. Irwin was 37 years old and had been with the Ralston company ever since it was organized.

F. W. Bird & Son, Walpole, Mass., have taken the advanced step of fixing a minimum wage of $1.75 a day for all employees who have been in the service for 30 days. At the same time the length of a working day has been reduced from ten hours to nine hours without a reduction in wages. Charles S. Bird, president of the company, is an active "progressive," and is carrying out in his plant one of the policies he advocates in politics.

The Titanium Alloy Manufacturing Company, Pittsburgh, Pa., during 1911, shipped 3,836,818 lbs. of titanium alloy. This alloy is used in amounts up to 0.6 per cent. in the treatment of steel. Taking 0.4 per cent. as the average percentage of titanium alloy used in the treatment of steel, the amount shipped during 1911 would be sufficient to treat 428,216 gross tons of steel. As the average quantity of alloy actually used was probably slightly less than 0.4 per cent., it is estimated that about 410,000 gross tons of steel were treated with titanium alloy last year.

The Roberts & Schaefer Company, Chicago, has just been awarded a contract by the Chesapeake & Ohio of Indiana for three large Holmen balanced bucket type coaling stations; one to be erected at Peru, Ind., having a capacity of 500 tons, the other two to have a capacity of 300 tons each, being duplicates, to be erected at Janney, Ind., and English Lake. The cost of the three coaling stations will be $35,000. This company has also been awarded a contract for a coal washing plant to be erected at the mine of the George B. Pope Company, at Johnson City, Ill., at a cost of $16,000.

## TRADE PUBLICATIONS.

RAIL ANCHORS.—The P. & M. Company, Chicago, has issued bulletin T-1712 concerning its rail anti-creeper, which shows photographs of the device in use and gives cost data concerning savings effected by the use of the device.

STEEL SHEET PILING.—The Carnegie Steel Company, in reissuing its pamphlet entitled Steel Sheet Piling, has enlarged the size of the booklet from 16 to 88 pages and has included full discussions on the various operations of driving and pulling such piling, with a series of valuable tables of data for use in construction work. The pamphlet contains a number of good illustrations.

DENVER & RIO GRANDE.—The passenger department has issued a handsomely illustrated booklet entitled "Around the Circle," descriptive of a sight-seeing tour of a thousand miles through the Rockies, over a circuitous route from Denver, Colorado Springs or Pueblo through Colorado and Northern New Mexico. There are twenty-five illustrations of the scenery of this region and two alinement maps showing the windings and turnings of the railway in the Marshall Pass and Toltec Gorge districts.

OREGON-WASHINGTON RAILROAD & NAVIGATION COMPANY.—The passenger department has issued a handsome, 48-page booklet, describing Portland, Ore., the "city of roses." Among the many illustrations are a map of the city and pictures of the principal office buildings, schools, churches, club-houses, parks, manufacturing plants, the harbor and many residences. Many interesting facts about the city, its climatic and other advantages, and directories of the principal points of interest are included in the descriptive matter.

# Railway Construction.

### New Incorporations, Surveys, Etc.

ARTESIAN BELT.—This road is now open for passenger and freight traffic between Macdona, Tex., and Christine, 43 miles. J. P. Jackson, chief engineer, Macdona.

ATCHISON, TOPEKA & SANTA FE.—Walter H. Denison, Wagoner, Okla., who has the general contract for building the remaining 90-mile section of the Texico-Coleman cut-off between Lubbock, Tex., and Texico, N. M., has sublet the work in 25 sections, and construction work will be pushed to completion. It is expected that the line will be ready for operation by January next. C. A. Morse, chief engineer of the system, Topeka, Kan. (July 26, p. 184.)

BIG CREEK LOGGING COMPANY.—A contract has been given to C. L. Houston, Astoria, Ore., and work is now under way building a five-mile logging line from a point near Knappa, Ore., to timberlands. E. C. Crossett, president.

BIRMINGHAM & SOUTHEASTERN.—An officer writes that grading contracts have been given to J. M. Sullivan and O. J. Priuett, to build an extension between Electric, Ala., and Equality. Contracts will be let during the next 30 days for track laying and bridge work. The plans call for putting up some stations and warehouses. W. M. Blount, president, Union Springs. (June 7, p. 1262.)

CAMBRIDGE, INDIAN VALLEY & EASTERN.—An officer writes that the proposed route from Cambridge, Idaho, east to Mesa Junction, 10 miles, thence southeasterly to Indian Valley, five miles. The entire line will be through Indian Valley and Salubria Valley. Contracts for building the line will be let as soon as bonds are sold. There will be two small bridges over the Little Weiser river, and some station and terminal buildings will be put up next year. The company expects to develop a traffic in fruit, grain, vegetables, dairy products and merchandise. C. K. Macay, president, Mesa; Lee Heighly, chief engineer, New Meadows.

FLEMINGTON, HINESVILLE & WESTERN.—An officer writes that contracts have been let to Hugins, Gaudy & Easterling, to build from McIntosh, Ga., on the Atlantic Coast Line, west via Flemington, to Hinesville, about 10 miles. Work is now under way, and track has been laid on three miles. There will be four trestles. The company expects to extend the line to Glennville, Tattnall county, 25 miles. J. B. Way, Hinesville, may be addressed.

GRAND TRUNK PACIFIC.—An officer writes that the Grand Trunk Pacific Branch Lines Company's line, being built from Regina, Sask., west via Moose Jaw, thence northwesterly is about all graded from Regina west to a point about 50 miles northwest of Moose Jaw. The grading was the general average for prairie construction, excepting four miles, which averaged 50,000 cu. yds. to the mile near Moose Jaw Creek crossing. The Cottonwood Creek valley trestle, which is to be 50 ft. high and 1,290 ft. long, is the only important trestle. The line passes through the northerly section of Moose Jaw, and no grading has yet been done within the city limits. Track has been laid from Regina west on 31 miles, and it is expected to have the line completed and in operation this coming fall. Rigby, Hyland & Plummer, Moose Jaw, has the grading contract. Traffic tributary to this branch will be grain, farm machinery and supplies, and general package freight. B. B. Kelliher, chief engineer, Winnipeg, Man. (August 9, p. 271.)

The Mountain division has been extended from Hinton, Alta., west to Fitzhugh, 50 miles.

GAINESVILLE, OKLAHOMA & WESTERN.—An officer writes that contracts are to be let within the next three weeks to build from Gainesville, in Cooke county, Tex., southwest through the northwestern part of Denton county, thence west through Wise county, crossing the Fort Worth & Denver City above Decatur, to Bridgeport, about 50 miles. The maximum grades will be 1 per cent., and maximum curvature 4 deg. The cut and fill work will average handling 15,821 cu. yds. to the mile. There will be 6,414 lineal ft. of trestles, also some station buildings, shops, etc. The company expects to develop a traffic in grain, cotton and products, manufacturing products, and mineral products. H. M. Aubrey, president, and T. N. Picnot, vice-president in charge of construction, San Antonio. (August 2, p. 228.)

LOUISVILLE & NASHVILLE.—Work has been finished on the Tuscaloosa Mineral, which has been under construction for some time from Tuscaloosa, Ala., east to a connection with the Louisville & Nashville at Brookwood, about 20 miles. The line was opened for business August 8, and it is being operated by the Louisville & Nashville. At the celebration in Tuscaloosa on Thursday, the opening day, Miss Annie Wallace Hays, assisted by five "maids of honor" drove a silver spike, completing the railway. Addresses were made by H. R. Foster, president of the Tuscaloosa Board of Trade, and by F. G. Blair, president of the Tuscaloosa Mineral Railroad Company.

LOUISIANA ROADS.—Residents of Cottonport, La., and neighboring towns are organizing a company to build from Plaucheville, La., northwest via Cottonport, thence north to a connection with the Louisiana Railway & Navigation Company at Mansura, or at Hessmer. The company is to have a capital of $50,000. T. Lemoine, president; L. A. Ducote, first vice-president; C. J. Calligari, second vice-president, and F. H. Hanley, secretary. It is expected that the line will be completed this coming fall.

LOUISIANA SOUTHERN.—An officer writes that this company, which is leased by the New Orleans, Texas & Mexico, one of the Frisco lines, has track laying completed on 20 miles from Belair, La., southeast to Bohemia, and all the work is about finished. No further extensions are contemplated at this time. The company expects to develop a traffic in rice, sugar cane, vegetables and oranges. (July 19, p. 144.)

MIDDLE TENNESSEE.—This road is now in operation from Franklin, Tenn., to Mount Pleasant, 41½ miles. G. B. Howard, chief engineer, Mt. Pleasant.

MINNESOTA, DAKOTA & WESTERN.—An officer writes that grading work south of International Falls, Minn., has been finished on 20 miles, and track-laying is just being started by the company's forces, with a Roberts track-laying machine. The grading work was carried out by M. W. Barnard, Minneapolis, Minn. It is expected that the line will be open for operation this coming winter. The principal commodities to be carried will be logs and pulp wood. C. S. Giles, chief engineer, International Falls.

OREGON ELECTRIC.—This road has been extended from Salem, Ore., west to Albany, 27 miles. L. B. Wickersham, chief engineer, Portland. (April 5, p. 824.)

PECOS VALLEY SOUTHERN.—An officer writes that the only contracts to be let on the branch from Saragosa, Tex., southeast to Fort Stockton, about 50 miles, will be for the grading work. The company is not yet ready to let the contracts. The maximum grades will be 0.8 per cent., and maximum curvature 4 leg. There will be two steel bridges and some trestles. The company expects to develop a traffic in alfalfa, fruit and lumber. W. L. Carwile, president, Dallas; L. W. Anderson, chief engineer, Pecos. (May 31, p. 1221.)

PIEDMONT & NORTHERN.—An officer writes that contracts have been let for work between Greenville, S. C., and Spartanburg, to the Parker Brooks Construction Company, Macon, Ga., for 17 miles on sections 58 to 74 inclusive; to Willard Boggs, Spartanburg, for sections 75 to 78 inclusive, and to J. Thomas Bennett, Charlotte, N. C., for sections 79 to 89 inclusive. Thomas B. Lee, chief engineer, Charlotte. (August 2, p. 229.)

QUANAH, ACME & PACIFIC.—An officer is quoted as saying that work was begun early this month on a 40-mile extension from Paducah, Tex., and it is expected that the line will be in operation to a point 15 miles west of Paducah by the middle of November next, and to the new town of Roaring Springs by March of next year. The plans call for building an extension from the present western terminus at Paducah west via Roswell, N. M., to El Paso, Tex., about 425 miles John A. Knox, chief engineer, Quanah.

ST. LOUIS & WESTERN TRACTION.—This company has been organized, it is said, to build a 25-mile line from Forest Park,

Mo., west through St. Louis county to the Missouri river. James D. Houseman, St. Louis, Mo., may be addressed.

SEABOARD AIR LINE.—The Mulberry branch of the Fifth division has been extended from Mulberry, Fla., to Royster Mine, seven miles. W. L. Seddon, chief engineer, Portsmouth, Va.

TAMPA & GULF COAST.—A new branch has been opened for freight service only from Tarpon Springs, Fla., to Port Richey, eight miles. C. H. Lutz, secretary, treasurer and general manager, Odessa, Fla.

TOINETTE & WESTERN.—An officer writes that this company has track laid on 12 miles from Toinette, Ala., westerly across St. Stephens road via Hawthorn to Fairview. J. W. Hill, Toinette, has the contract for grading. The work yet to be done consists mainly of straightening out curves and strengthening bridges. Plans are being made to build an extension west to a point on the Tombigbee Valley Railroad, at or near Seaboard. The principal commodities to be carried are lumber, naval stores, farming implements and produce. S. R. Cochran, president, 377 Main street, Greenville, Pa.

TUSCALOOSA MINERAL.—See Louisville & Nashville.

## RAILWAY STRUCTURES.

BRUNSWICK, GA.—The receivers of the Atlanta, Birmingham & Atlantic have been given permisison to issue receivers' certificates, a part of the proceeds of which are to be spent for improvements at Brunswick, which include deepening the channel for the Clyde Steamship Line to the Atlanta, Birmingham & Atlantic dock.

BURLINGTON, VT.—The Public Service Commission of Vermont has endorsed the plans of the Central Vermont for a new union station, which calls for track elevation and the separation of grades. The commission has rejected the plans of the Rutland Railroad.

CHARLOTTE, N. C.—An officer of the Seaboard Air Line writes that work has been held up temporarily on the new freight house to be built at Charlotte. The cost of the improvements will be between $50,000 and $75,000.

GASTONIA, N. C.—An officer of the Southern Railway writes that a new station is to be built of white pressed brick, with tile roofing at Gastonia. The main building will be 140 ft. long, with 40-ft. sheds at each end. The tracks of the main line will be moved a few feet north to provide more room between the station and the trains. The building will be electrically lighted and steam heated. The work will probably be started next month, and it is expected that the station will be completed during December.

NEW YORK.—The Baltimore & Ohio has given contracts for building a reinforced concrete warehouse, to have eight stories and basement, on the corner of Twenty-sixth street and Eleventh avenue, New York City. The Phoenix Construction Company, New York, has the contract for the foundation work, and the Turner Construction Company, New York, will erect the superstructure of the terminal. The first floor of the warehouse will be used as a freight house. The seven stories above and the basement below will be used for storage. The cost of the warehouse will be between $400,000 and $500,000. Plans and specifications were prepared by M. A. Long, architect for the Baltimore & Ohio.

OSWEGO, N. Y.—The New York Central has let a contract to the Phoenix Bridge Company for a 1,500-ton bridge.

PRESCOTT, ONT.—The Grand Trunk Railway has secured a large tract of land for a terminal site at Prescott, on the St. Lawrence river, opposite Ogdensburg, N. Y., and is to carry out terminal improvements during the next two years at a cost of $150,000. The plans call for building a 25-stall roundhouse with provision for ten extra stalls and building machine repair shops.

ST. JOSEPH, MO.—The Chicago, Burlington & Quincy has ordered 115 tons of structural steel for a new freight house.

SELMA, ALA.—An officer of the Southern Railway writes that the freight house at Selma is to be repaired and remodeled. The plans call for a new outbound freight shed, 300 ft. long x 25 ft. wide, with a 60-ft. platform at its east end. The new shed is to be built north of the present station. There will also be a platform 325 ft. long between the present station and the new outbound shed.

# Railway Financial News.

BUFFALO & SUSQUEHANNA.—This company has called $56,000 series A, and $5,500 series B first mortgage 5 per cent. bonds, dated October 1, 1893, for payment at par and interest on October 1, at Harvey Fisk & Sons, New York.

BUFFALO, ROCHESTER & PITTSBURGH.—Application has been made to the New York Public Service Commission, Second district, for permission to issue $1,187,079 consolidated mortgage bonds, bearing interest at 4½ per cent., to provide for extensions and betterments.

CHICAGO & WESTERN INDIANA.—The directors have authorized a $200,000,000 mortgage, partly for the purchase of the property of the Chicago Union Transfer, including 4,000 acres of land and 100 miles of track. Of the bond issue authorized, it is planned to sell only comparatively small amounts in the near future. About $50,000,000 bonds are reserved under the mortgage for refunding the present indebtedness of the Chicago & Western Indiana. All the bonds will be secured by the property of the Chicago & Western Indiana. See item in General News.

CUMBERLAND CORPORATION.—This company, which controls the Carolina, Clinchfield & Ohio, and the Clinchfield Coal Corporation, has recently issued $5,000,000 three-year 5 per cent. notes, dated June 1, 1912, secured by $25,000,000 Carolina, Clinchfield & Ohio common stock, and by $5,000,000 of the preferred stock of that company. These notes are convertible at par into preferred stock of the railway company. The $15,000,000 notes of the Cumberland Corporation which matured June 1 have been paid off.

DENVER, NORTHWESTERN & PACIFIC.—After the conference of the committee representing the note holders, held at the Bankers' Trust Company, New York, last week, Benjamin Strong, Jr., vice-president of the Bankers' Trust Company, and chairman of the note holders' committee, said, "Certain modifications of the so-called 'Erb plan' were discussed, and some of them mutually agreed upon. Other points are still under consideration."

MISSOURI, KANSAS & TEXAS.—This company has taken over the Wichita Falls & Northwestern and the Wichita Falls & Southern. The former extends from Wichita Falls, Tex., to Forgan, Okla., and the latter from Wichita Falls south to Newcastle, 65 miles.

PARIS & MOUNT PLEASANT.—This company has received permission from the Texas railway commission to issue $300,000 bonds and $75,000 stock on the extension from Bogota, Tex., to Mount Pleasant. This line runs from Paris to Bogota, 24 miles, and is under construction from Bogota to Mount Pleasant, 29 miles.

CUBAN RAILWAY LEASE.—The Jucaro to San Fernando railway, Cuba, has been leased to the Southern Railways for 10 years. A number of improvements are to be made by the lessees.

NEW SOUTH AMERICAN TRANSCONTINENTAL RAILWAY.—A preliminary survey of the transcontinental railway, which will unite the Argentine railway system with the proposed line from Valdivia, Chile, to the Argentine frontier, has been completed. The new railway will be built from San Antonio, in the interior of Argentina, to a connection with a line from Valdivia.

CANTON-HANKOW RAILWAY, CHINA.—There is renewed activity in building the Canton-Hankow railway, China, northward. This line, which will connect Hongkong with central China, is operating to Lai T'ang, a small village 67 miles from Canton. Grading and bridging up to Mile 79 is almost completed, but grading between there and Mile 85 is delayed because of objections from natives. Bridging and grading up to Mile 112 is nearly finished. Work between Mile 130 and Mile 140 is in progress and that on the section up to Mile 180 is being rapidly advanced. One of the greatest obstacles to be overcome is the objections raised by natives.

# ANNUAL REPORT

## BUFFALO, ROCHESTER & PITTSBURGH—TWENTY-SEVENTH ANNUAL REPORT.

The Directors of the Buffalo, Rochester and Pittsburgh Railway Company submit to the stockholders the following report for the year ending June 30, 1912:

### ROAD OPERATED.

| | 1912. Miles. | 1911. Miles. | Incr'se. Miles. | Decr'se. Miles. |
|---|---|---|---|---|
| Owned | 356.22 | 352.10 | 4.12 | .... |
| Leased | 87.28 | 93.83 | .... | 6.55 |
| Trackage rights | 126.32 | 126.74 | .... | .42 |
| Total length of road operated | 569.82 | 572.67 | .... | 2.85 |
| Second track (owned) | 111.13 | 111.13 | .... | .... |
| Second track (trackage rights) | 81.29 | 81.63 | .... | .34 |
| Sidings (owned and leased) | 319.86 | 309.76 | 10.10 | .... |
| Total miles of all tracks, all steel rail. | 1,082.10 | 1,075.19 | 6.91 | .... |

The decrease in length of road operated is due to a reclassification of all tracks, whereby 2.51 miles were transferred from main line and branches to sidings; and the reduction of .34 miles in trackage rights between Mt. Jewett and Johnsonburg, Pa., caused by a change of alignment.

Including the above mentioned transfer, sidings were increased 10.10 miles.

### INCOME.

| | 1912. | 1911. | Increase or Decrease. |
|---|---|---|---|
| Rail Operations: | | | |
| Operating revenues | $9,542,367.78 | $9,134.402.03 | +$407,965.75 |
| Operating expenses | 6,464,228.57 | 6,145,855.52 | + 318,373.05 |
| Net operating revenue | $3,078,139.21 | $2,988,546.51 | + $89,592.70 |
| Outside Operations: | | | |
| Revenues | $21,803.74 | $18,868.52 | + $2,935.22 |
| Expenses | 21,795.66 | 20,857.57 | + 938.09 |
| Net revenue | $8.08 | Def. $1,989.05 | + $1,997.13 |
| Total net revenue | $3,078,147.29 | $2,986,557.46 | + $91,589.83 |
| Taxes Accrued | 204,000.00 | 212,000.00 | — $8,000.00 |
| Operating Income | $2,874,147.29 | $2,774.557.46 | + $99,589.83 |
| Other Income | 779,578.22 | 840,517.59 | — $60,939.37 |
| Gross corporate income | $3,653,725.51 | $3,615,075.05 | + $38,650.46 |
| Deductions for Interest and Rentals | 1,882,830.84 | 1,905,798.00 | — $22,967.16 |
| Net corporate income | $1,770,894.67 | $1,709,277.05 | + $61,617.62 |
| Appropriations: | | | |
| Pension Fund | $4,564.33 | $10,069.42 | — $5,505.09 |
| Special appropriation | 375,000.00 | 371,500.00 | + 3,500.00 |
| Total Appropriations | $379,564.33 | $381,569.42 | — $2,005.09 |
| Surplus available for dividends. | $1,391,330.34 | $1,327,707.63 | + $63,622.71 |

Taxes decreased $8,000, or 3.77 per cent., due to lower assessments on capital stock, bonds and net earnings.

A special appropriation of $375,000 was made from the Net Corporate Income. Of this amount $125,000 was paid into the Sinking Funds under Equipment Agreements Series A, B and C for the purchase of new rolling stock; $48,000 was used to retire a like amount of Equipment Bonds Series G; and $202,000 represents one-half of the principal of Equipment Bonds Series D, E and F paid during the year, the other half being refunded by 4½ per cent. bonds issued under the terms of the Consolidated Mortgage, and held in the Treasury of the Company.

### DIVIDENDS.

| Dividends in cash were paid on: | | 1912. | 1911. | Increase. |
|---|---|---|---|---|
| Preferred stock | $6,000,000 | 6% $360,000 | 6% $360,000 | |
| Common stock | 10 500 000 | 5% 525,000 | 4½% 472,500 | $52,500 |
| Total | $16,500,000 | $885,000 | $832,500 | $52,500 |

Since the close of the fiscal year, your Board of Directors has declared a semi-annual dividend of three per cent. on the preferred stock and three per cent. on the common stock, both payable August 15, 1912.

### CAPITAL STOCK.

There has been no change during the year in this account. The total outstanding Capital Stock of the Company amounts to $16,500,000, and consists of $6,000,000 preferred stock and of $10,500,000 common stock.

### FUNDED DEBT.

Equipment Bonds Series G authorized in 1910 were issued to the amount of $1,200,000.

Under the terms of the Sinking Funds for the redemption of Equipment Bonds, $452,000 bonds were retired as follows: $113,000 of Series D; $114,000 of Series E; $177,000 of Series F, and $48,000 of Series G.

In accordance with the provisions of the Consolidated Mortgage of 1907 the Trustee delivered to the company $202,000 Consolidated Mortgage 4½% Bonds, representing 50% of Equipment Bonds Series D, E and F retired during the year. These bonds, added to those in the Treasury of the Company, make a total of $1,114,000 held in reserve.

The net result is an increase of $748,000 in the bonded debt of the Company outstanding on June 30, 1912.

### CONSTRUCTION.

Capital account has been charged during the year with $633,664.19 for additions and betterments to your property, as follows:

| | |
|---|---|
| Land | $35,225.32 |
| New station, Scottsville, N. Y. | 10,812.87 |
| " Mumford, N. Y. | 17,175.36 |
| " Orchard Park, N. Y. | 28,116.73 |
| " Salamanca, N. Y. | 13,480.47 |
| Other station improvements | 7,967.61 |
| Reservoir and pipe line, Ketner, Pa. | 86,289.15 |
| " " Creekside, Pa. | 10,759.59 |
| " " Falls Creek, Pa. | 19,411.44 |
| Indiana tunnel improvements | 12,299.82 |
| Second track, Newton, Pa., to Mt. Jewett, Pa. | 5,314.62 |
| Increased weight of rail and fastenings | 53,535.24 |
| Improving bridges and culverts | 70,374.66 |
| Telephone train despatching lines | 23,061.28 |
| Sidings and yard extensions | 68,643.73 |
| Jacksonville mine line | 47,270.82 |
| Lucerne mine line | 20,512.49 |
| Elimination of grade crossings | 16,273.49 |
| New roadway machinery | 7,516.18 |
| Automatic block signals | 69,249.45 |
| Coal trestle and docks, Genesee Dock, N. Y. | 3,952.30 |
| Other items | 6,421.57 |
| Total | $633,664.19 |

The following work, referred to in last year's report, was completed:

New brick station at Scottsville, N. Y.

Automatic block signals on double-track, between Clarion Junction Pa., and Falls Creek, Pa., a distance of 35 miles.

New brick stations were constructed at Mumford, N. Y., and Orchard Park, N. Y.

The grade crossing at Wheatland, N. Y., was abolished by the erection of an overhead bridge.

Additional passing sidings, yard and industrial tracks, have been provided as business demanded.

Among the important work, now in progress, may be mentioned:

New brick station at Salamanca, N. Y.

Reservoir and pipe lines at Ketner, Pa., and Falls Creek, Pa.

Lining Indiana tunnel.

Replacing various timber bridges, trestles and culverts in permanent form.

Jacksonville and Lucerne mine lines.

Telephone train despatching line on Rochester and Buffalo Divisions.

Automatic block signals for fifty-three miles on Rochester Division.

The expenditures for these improvements will materially increase your Company's facilities for the safe and economical handling of the growing traffic.

### EQUIPMENT.

Expenditures were made for new rolling stock as follows:

| | |
|---|---|
| Three passenger locomotives | $63,342.50 |
| Seven freight locomotives | 152,114.50 |
| Three cafe-observation parlor cars | 56,363.19 |
| Fifteen hundred steel coal cars | 1,111,085.68 |
| One locomotive crane hoist | 8,367.15 |
| One locomotive pile driver | 12,682.93 |
| One wrecking crane | 14,131.93 |
| Three caboose cars, built at Company's shops | 1,844.04 |
| Steel underframes applied on two hundred and thirty-six gondola cars | 12,992.20 |
| Sundry other betterments, including re-classification or transfer of nine freight cars and fifty work equipment cars | 72,951.22 |
| | $1,505,875.34 |

In addition to the above, seventeen steel passenger train cars and one hundred steel flat cars were purchased, but owing to late delivery will be accounted for in next year's report.

There was credited for equipment sold, transferred or destroyed, the following values, charged in part to Operating Expenses, and the balance, representing the depreciation since June 30, 1907, charged to Reserve for Accrued Depreciation:

| | | |
|---|---|---|
| Thirteen locomotives | $80,518.79 | |
| Two passenger train cars | 4,497.70 | |
| Five hundred and one freight train cars | 201,705.23 | |
| **Seventeen work equipment cars** | 11,137.70 | |
| | | 297,859.42 |
| Making a net increase of | | $1,208,015.92 |

The total tractive power of engines aggregates 9,622,160 pounds, an increase of 165,200 pounds over last year. The average tractive power of each engine increased 1,013 pounds, being 33,180 pounds as against 32,167 pounds last year.

All cars in freight service are provided with automatic couplers and 99.29 per cent. of the cars are equipped with air brakes.

The total carrying capacity of cars in freight service now amounts to 668,744 tons, an increase of 61,225 tons over last year. The average carrying capacity or efficiency of each freight car increased 1.38 tons, being 40.23 tons as against 38.85 tons last year.

The book value of rolling stock sold, transferred or destroyed, is credited to Additions and Betterments—Equipment, and Operating Expenses is debited (less the salvage carried to Material Account, and less the amount previously written off for depreciation, charged against the Reserve for Accrued Depreciation). When rolling stock is purchased or rebuilt, the cost is charged direct to Additions and Betterments—Equipment account.

The reserve for accrued depreciation of equipment on June 30, 1912, amounted to $1,518,222.96.

### PASSENGER REVENUES.

The average rate received per passenger per mile increased .011 cents, being 2.071 cents as compared with 2.060 cents a year ago.

The average distance each passenger was carried decreased 2.17 miles, being 26.31 miles, against 28.48 miles last year.

| | | |
|---|---|---|
| Passengers carried in 1912 | 1,942,226 | |
| Passengers carried in 1911 | 1,817,038 | |
| An increase of 6.89 per cent., or | | 125,188 |
| Passengers carried one mile in 1912 | 51,101,188 | |
| Passengers carried one mile in 1911 | 51,751,214 | |
| A decrease of 1.26 per cent., or | | 650,026 |

The result is a decrease of $7,723.00 in gross passenger revenues.

### FREIGHT REVENUES.

The average rate received per ton per mile decreased .07 mills, being 4.80 mills, as compared with 4.87 mills last year.

The average distance each ton was hauled increased 4.64 miles, being 159.31 miles, against 154.67 miles a year ago.

Pending an adjustment of the miners' wage scale, most of the collieries shipping on your line were idle during April. In spite of this loss, the revenue tonnage moved was the largest in the history of the Company, and is as follows:

| | 1912. | 1911. | Increase. | Decrease. |
|---|---|---|---|---|
| Bituminous coal | 7,188,280 | 6,950,767 | 237,513 | |
| Coke | 538,452 | 627,206 | | 88,754 |
| Iron ore | 263,574 | 243,610 | 19,964 | |
| Pig and bloom iron | 231,857 | 188,830 | 43,027 | |
| Other freight | 2,475,986 | 2,271,838 | 204,148 | |
| Total | 10,698,149 | 10,282,251 | | |
| An increase of 4.04 per cent., or | | | 415,898 | |

With the exception of a decrease of 14.2 per cent. in coke, all of the general commodities show gains.

| | | |
|---|---|---|
| Tons moved one mile in 1912 | 1,704,307,001 | |
| Tons moved one mile in 1911 | 1,590,341,454 | |
| An increase of 7.17 per cent., or | | 113,965,547 |

The result for the year is a gain of $426,549.94 in gross freight revenue.

## EXPENSES.

Operating Expenses increased $318,373.05, or 5.18 per cent., due principally to the larger volume of freight traffic and partly to the severe weather conditions, the expense of replacement work, the inauguration of depreciation charges on machinery and tools, wage adjustments, and the employment of extra trainmen in Pennsylvania under the requirements of the so-called "full-crew bill," which became operative at the beginning of the fiscal year.

The operating ratio increased .46 per cent., being 67.74 per cent., against 67.28 per cent. last year.

The percentage of each group of operating expenses to gross earnings for the past five years, is as follows:

| | 1912. | 1911. | 1910. | 1909. | 1908. |
|---|---|---|---|---|---|
| Maintenance of way | 12.52 | 12.57 | 13.65 | 10.72 | 12.71 |
| Maintenance of equipment | 18.94 | 19.35 | 20.78 | 21.45 | 23.01 |
| Traffic | 1.26 | 1.44 | 1.35 | 1.41 | 1.28 |
| Transportation | 32.88 | 32.11 | 28.55 | 29.22 | 32.39 |
| General | 2.14 | 1.81 | 1.74 | 2.25 | 2.10 |
| Total | 67.74 | 67.28 | 66.07 | 65.05 | 71.49 |

The Company's property has been fully maintained at a high standard.

The average cost per ton per mile is 3.01 mills, being .06 mills less than last year.

The average number of revenue tons carried one mile per revenue freight train mile, excluding the mileage of helping engines, increased 12.72 tons, being 647.41 tons, against 634.69 tons a year ago.

The average number of revenue tons carried one mile per revenue freight engine mile, including the mileage of helping engines, increased 9 tons, being 439, against 430 a year ago.

The averages for the past ten years are as follows:

| YEAR. | TRAIN LOAD. | ENGINE LOAD. |
|---|---|---|
| 1903 | 441 | 364 |
| 1904 | 439 | 357 |
| 1905 | 507 | 374 |
| 1906 | 525 | 418 |
| 1907 | 543 | 435 |
| *1908 | 530 | 371 |
| *1909 | 597 | 400 |
| *1910 | 638 | 420 |
| *1911 | 635 | 430 |
| *1912 | 647 | 439 |

*The figures from 1908 to date are based on the Interstate Commerce Commission's classification of locomotive and train mileage.

The average number of revenue passengers carried one mile per revenue passenger train mile is 38, being 2 less than last year.

The non-revenue traffic, not included in any of the other figures of this report, is as follows:

| | 1912. | 1911. |
|---|---|---|
| Number of passengers | 275,546 | 262,445 |
| Number of passengers carried one mile | 10,880,382 | 10,285,321 |
| Number of tons | 972,545 | 911,360 |
| Number of tons carried one mile | 88,403,527 | 73,811,354 |

## ALLEGHENY & WESTERN RAILWAY CO.

Advances were made to the Allegheny & Western Ry Co. for additions and betterments expenditures, as follows:

| | |
|---|---|
| Land | $4,572.22 |
| Grade revisions and changes of line | 9,879.48 |
| Bridges, trestles and culverts | 3,075.69 |
| Track fastenings and other material | 4,335.31 |
| Sidings and yard extensions | 21,211.21 |
| Water and fuel stations | 4,748.75 |
| Other items | 880.78 |
| | $48,703.47 |

With the exception of the revision of line near Cowan, Pa., still under way, all of the work mentioned above is completed.

## FIRE INSURANCE FUND.

The assets in this fund were increased $20,547.27 during the year, and now amount to $236,748.12 in interest-bearing securities and cash.

## PENSION FUND.

The assets in this fund, created July 1, 1903, were increased $12,085.84 during the year, and now amount to $177,319.70 in interest-bearing securities and cash.

There were fifty-one pensioners upon the roll on June 30, 1912, a net increase of five during the year.

## GENERAL REMARKS.

The Ontario Car Ferry Company, Limited, paid a dividend of 5% for the year ending December 31, 1911. The sum of $12,485 received on the $249,700 of this Company's stock was credited to Other Income account.

Loans amounting to $57,850 were made to the corporation organized by your Company to acquire and hold real estate, referred to in last year's report, making a total of $297,850 advanced to date.

Mr. Hamilton F. Kean was, on November 23, 1911, elected a Director to fill the vacancy in the Board caused by the death of Mr. A. Lanfear Norrie.

The acknowledgments of the Board are renewed to the officers and employes for their faithful and efficient services.

Statements and statistics of the operation of your road for the year are submitted herewith. By order of the Board,

WILLIAM T. NOONAN,
*President.*

Rochester, N. Y., July 29, 1912.

## INCOME ACCOUNT.

### OPERATING REVENUES.

| RAIL OPERATIONS— | 1912. | 1911. | INCREASE. | DECREASE. |
|---|---|---|---|---|
| FREIGHT— | | | | |
| Coal | $5,281,501.21 | $5,025,847.56 | $255,653.65 | |
| Coke | 571,451.60 | 576,578.37 | | $5,126.77 |
| Merchandise | 2,321,775.64 | 2,145,752.58 | 176,023.06 | |
| Total | $8,174,728.45 | $7,748,178.51 | $426,549.94 | |
| PASSENGER | 1,058,260.42 | 1,065,983.42 | | $7,723.00 |
| OTHER TRANSPORTATION— | | | | |
| Excess baggage | 10,386.00 | 9,922.55 | 463.45 | |
| Mails | 50,247.21 | 50,100.37 | 146.84 | |
| Express | 82,558.39 | 52,685.58 | 29,872.81 | |
| Milk | 15,007.56 | 13,733.01 | 1,274.55 | |
| Switching | 104,256.38 | 111,262.57 | | 7,006.19 |
| Sundry sources | 3,290.44 | 8,628.73 | | 5,338.29 |
| Total | $265,745.98 | $246,332.81 | $19,413.17 | |
| OTHER OPERATIONS— | | | | |
| Station and train privileges | 3,863.71 | 4,064.47 | | $200.76 |
| Car service | 5,565.00 | 9,355.80 | | 3,790.80 |
| Ganson St. Docks | 29,043.85 | 55,227.90 | | 26,184.05 |
| Sundry sources | 5,160.37 | 5,259.12 | | 98.75 |
| Total | $43,632.93 | $73,907.29 | | $30,274.36 |
| TOTAL OPERATING REVENUES | $9,542,367.78 | $9,134.402.03 | $407,965.75 | |

### OPERATING EXPENSES.

| | | | | |
|---|---|---|---|---|
| Maintenance of way and structures | $1,195,262.96 | $1,148,663.46 | $46,599.50 | |
| Maintenance of Equipment | 1,807,076.51 | 1,767.456.36 | 39,620.15 | |
| Traffic expenses | 120,108.16 | 131,403.06 | | $11,294.90 |
| Transportation exps. | 3,137,299.76 | 2,933,141.80 | 204,157.96 | |
| General expenses | 204,481.18 | 165,190.84 | 39,290.34 | |
| TOTAL OPERATING EXPENSES | $6,464,228.57 | $6,145,855.52 | $318,373.05 | |
| NET OPERATING REV. | $3,078,139.21 | $2,988,546.51 | $89,592.70 | |
| OUTSIDE OPERATIONS— | | | | |
| Revenues | 21,803.74 | 18,868.52 | 2,935.22 | |
| Expenses | 21,795.66 | 20,857.57 | 938.09 | |
| Net revenue | $8.08 | | $1,997.13 | |
| Net deficit | | $1,989.05 | | |
| TOTAL NET REVENUE— | $3,078,147.29 | $2,986,557.46 | $91,589.83 | |
| TAXES ACCRUED | 204,000.00 | 212,000.00 | | $8,000.00 |
| OPERATING INCOME | $2,874,147.29 | $2,774,557.46 | $99,589.83 | |
| OTHER INCOME— | | | | |
| Rents—Hire of Equipment | 538,883.23 | 570,635.14 | | $31,751.91 |
| Rents—Joint Facilities | 148,579.59 | 142,182.25 | 6,397.34 | |
| Dividends on stocks owned | 12,485.00 | 12,485.00 | | |
| Interest on securities, loans and accounts. | 66,304.16 | 102,735.91 | | 36,431.75 |
| Miscellaneous | 13,326.24 | 12,479.29 | 846.95 | |
| TOTAL OTHER INCOME | $779,578.22 | $840,517.59 | | $60,939.37 |
| GROSS CORPORATE INC. | $3,653,725.51 | $3,615,075.05 | $38,650.46 | |

### DEDUCTIONS FROM GROSS CORPORATE INCOME.

| | | | | |
|---|---|---|---|---|
| RENTS ACCRUED FOR LEASE OF OTHER ROADS— | | | | |
| Allegheny & Western Railway | $272,000.00 | $272,000.00 | | |
| Clearfield & Mahoning Railway | 86,500.00 | 86,500.00 | | |
| Mahoning Val. Railroad | 15,000.00 | 15,000.00 | | |
| Total | $373,500.00 | $373,500.00 | | |
| Rents—Joint Facilities | 284,278.76 | 284,176.45 | $102.31 | |
| " —Miscellaneous | 16,737.75 | 16,510.15 | 227.60 | |
| Total | $301,016.51 | $300,686.60 | $329.91 | |
| INTEREST ACCRUED ON FUNDED DEBT— | | | | |
| First Mort. Bonds— Roch. & Pitts. Rd. | $78,000.00 | $78,000.00 | | |
| Consol. Mort. Bonds— Roch. & Pitts. Rd. | 235,200.00 | 235,200.00 | | |
| General Mort. Bonds— B., R. & P. Ry. | 221,350.00 | 221,350.00 | | |
| Consol. Mort. Bonds— B., R. & P. Ry. | 278,505.00 | 276,581.24 | $1,923.76 | |
| First Mort. Bonds— L., P. & C. Rd. | 17,500.00 | 17,500.00 | | |
| Equipment Agreements | 377,340.14 | 380,632.51 | | $3,292.37 |
| Real Estate Mortgage | | 550.00 | | 550.00 |
| Total | $1,207,895.14 | $1,209,813.75 | | $1,918.61 |
| Interest on Loans | 419.19 | 21,797.65 | | 21,378.46 |
| TOTAL DEDUCTIONS | $1,882,830.84 | $1,905,798.00 | | $22,967.16 |
| NET CORPORATE INC. | $1,770,894.67 | $1,709,277.05 | $61,617.62 | |

### DISPOSITION OF NET CORPORATE INCOME.

| | | | | |
|---|---|---|---|---|
| APPROPRIATIONS— | | | | |
| Pension Fund | $ 4,564.33 | $10,069.42 | | $5,505.09 |
| New Equipment | 125,000.00 | 125,000.00 | | |
| Retirement of Equipment bonds | 250,000.00 | 246,500.00 | $3,500.00 | |
| DIVIDENDS DECLARED— | | | | |
| PREFERRED STOCK— (No. 36) 3% on $6,000,000, payable Aug. 15, 1911 | 180,000.00 | 180,000.00 | | |
| (No. 37) 3% on $6,000,000, payable Feb. 15, 1912 | 180,000.00 | 180,000.00 | | |
| COMMON STOCK— (No. 23) 2½% on $10,500,000, payable Aug. 15, 1911 | 262,500.00 | 210,000.00 | 52,500.00 | |
| (No. 24) 2½% on $10,500,000, payable Feb. 15, 1912 | 262,500.00 | 262,500.00 | | |
| Total Charges | $1,264,564.33 | $1,214,069.42 | $50,494.91 | |
| BALANCE TRANSFERRED TO PROFIT AND LOSS ACCOUNT | $506,330.34 | $495,207.63 | $11,122.71 | |